

Figure 1

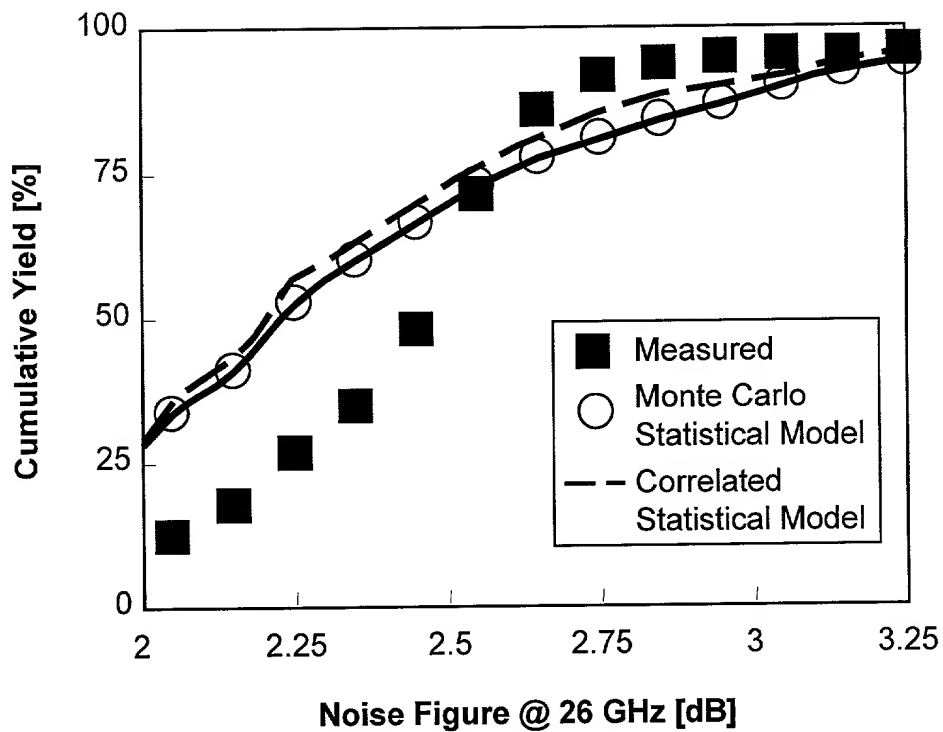


Figure 2A

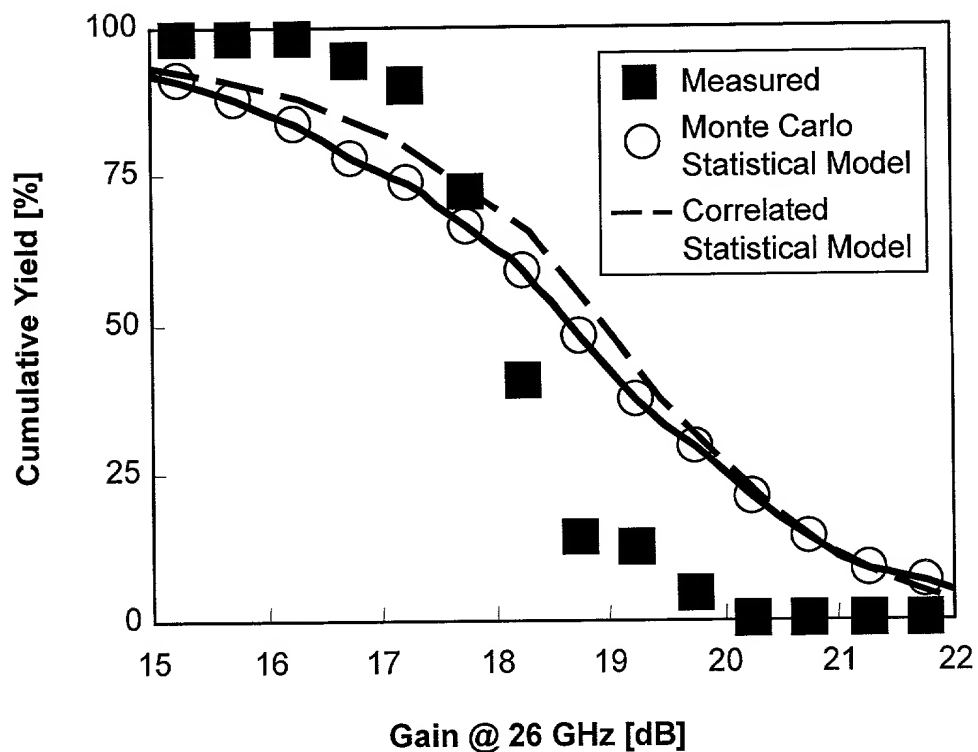


Figure 2B

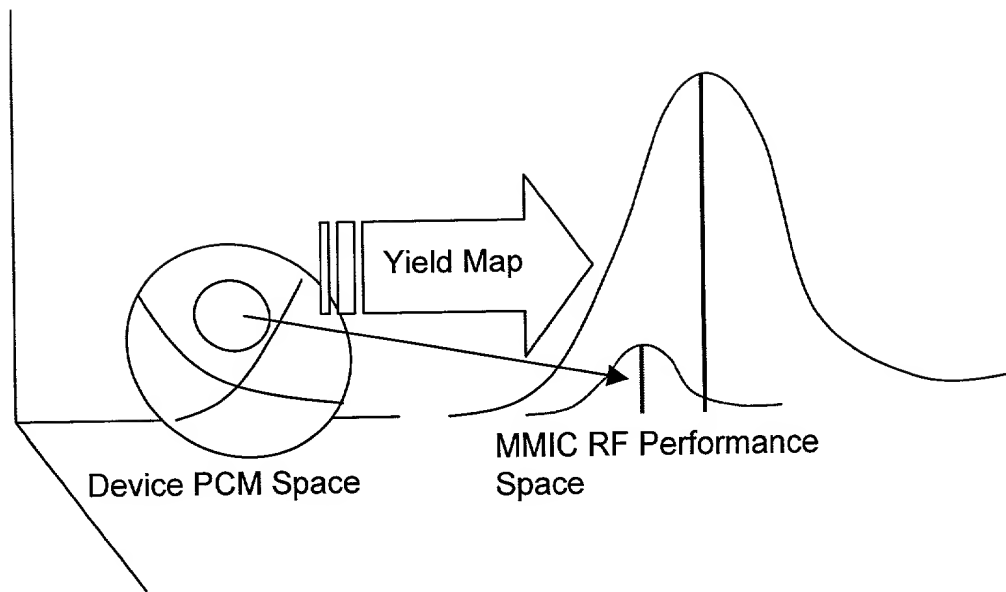


Figure 3

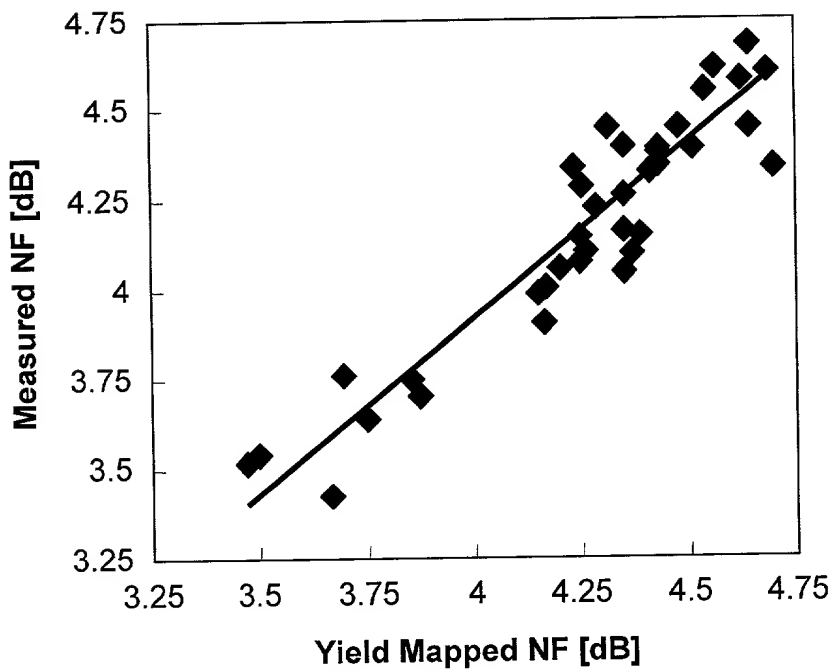


Figure 4

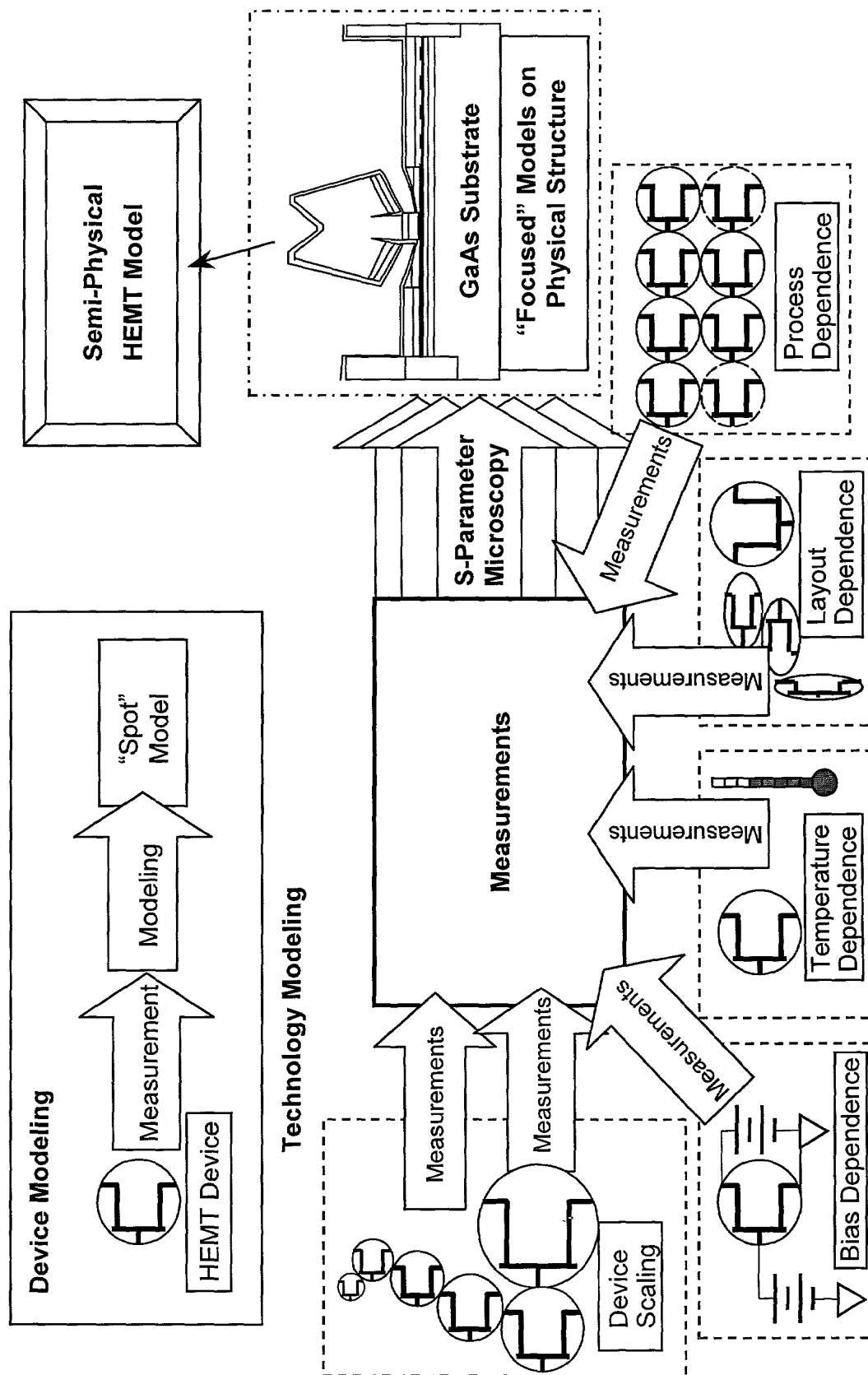


Figure 5

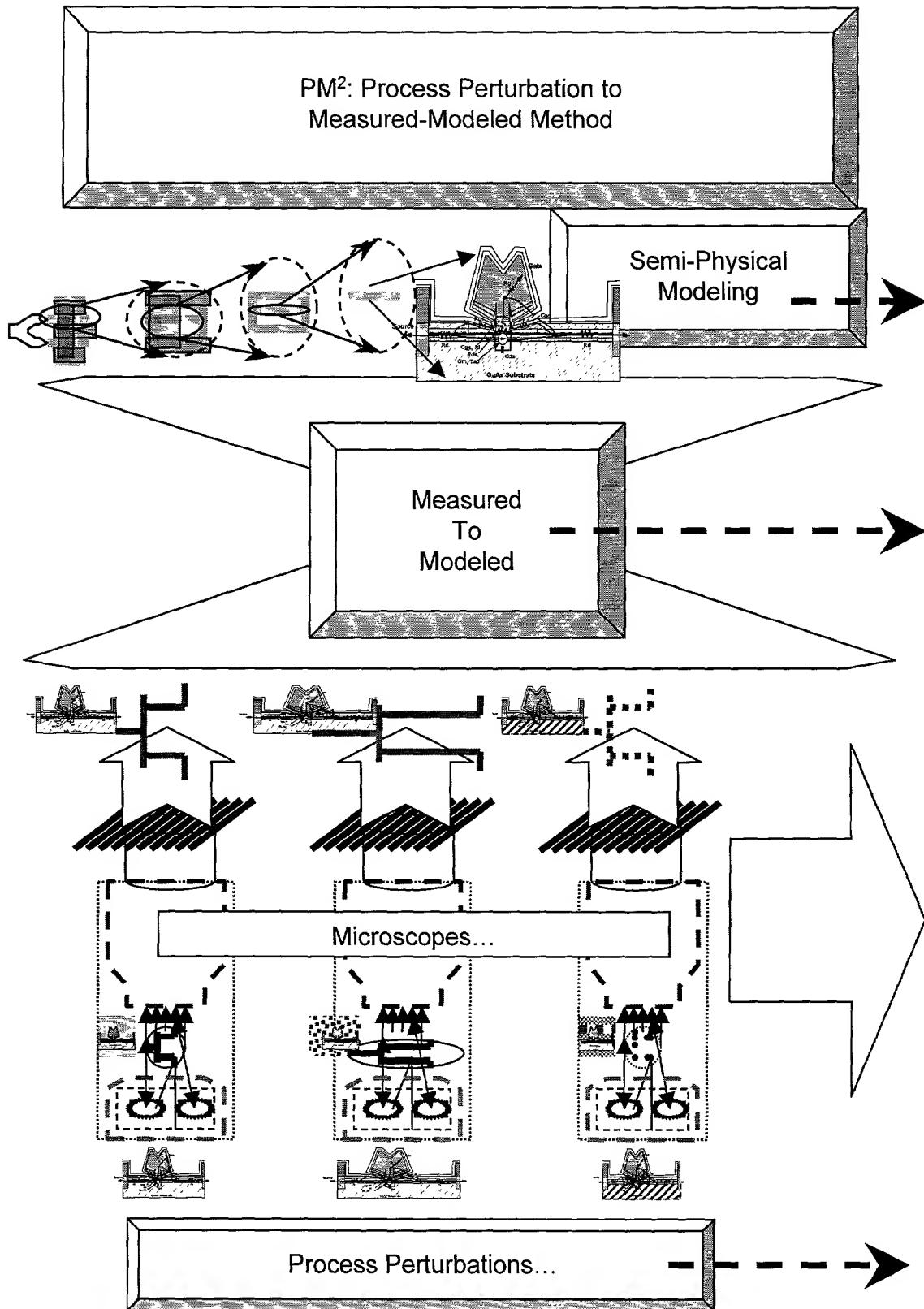


Figure 6

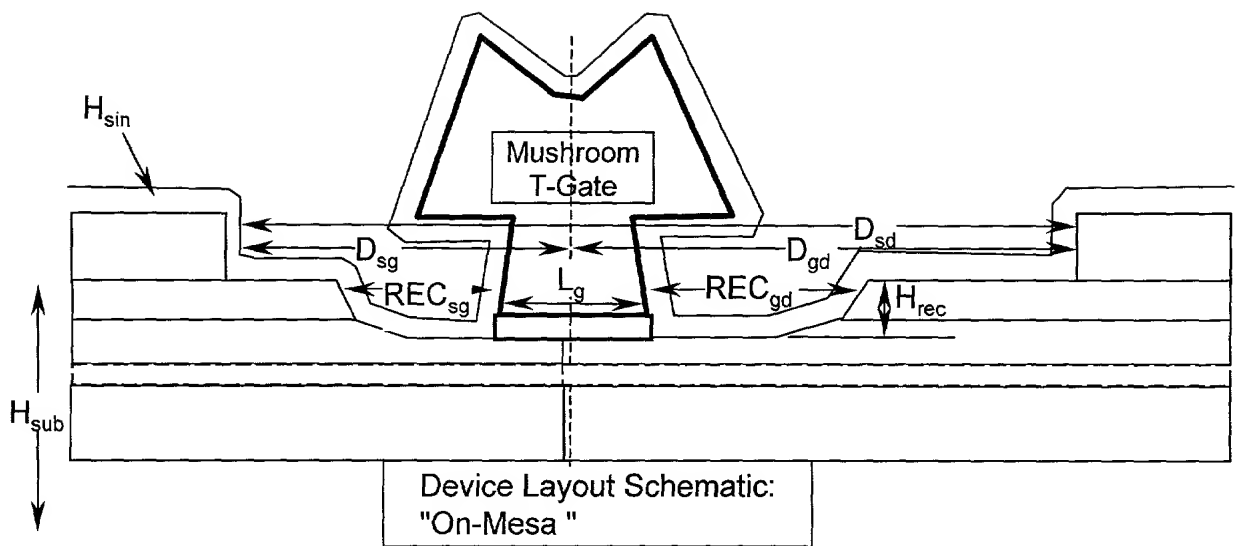


Figure 7A

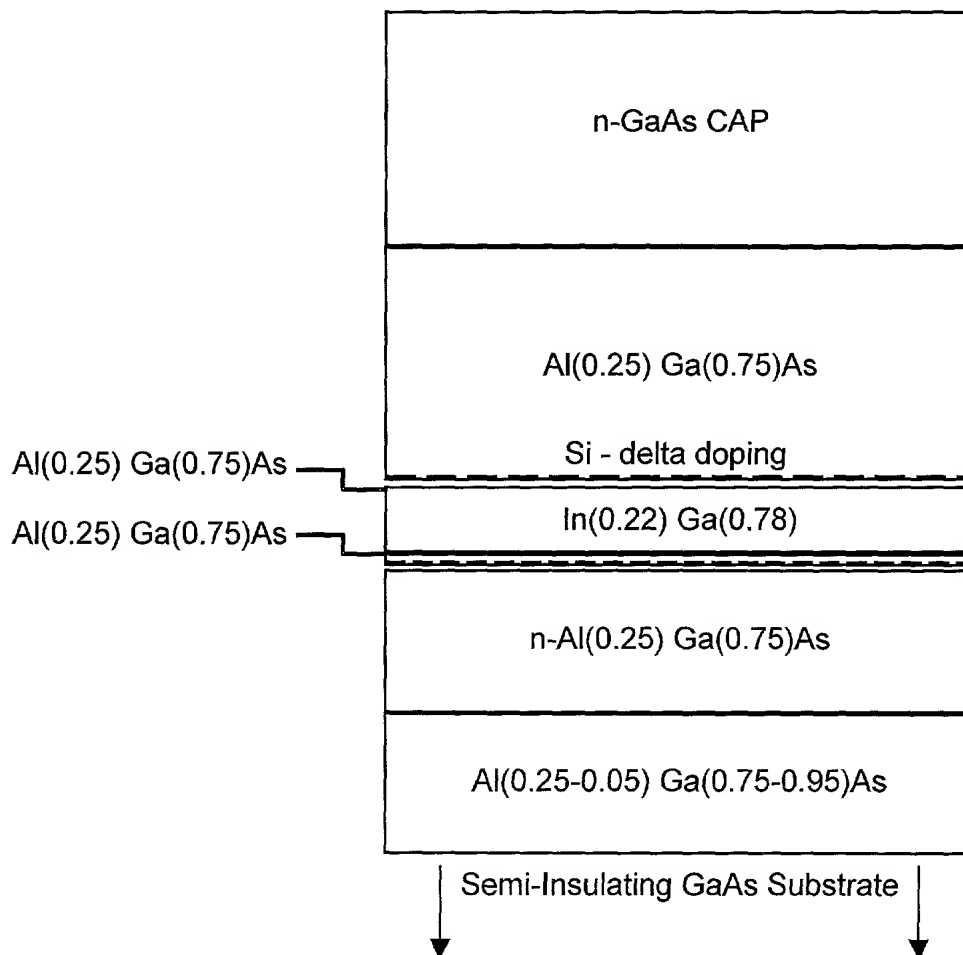


Figure 7B

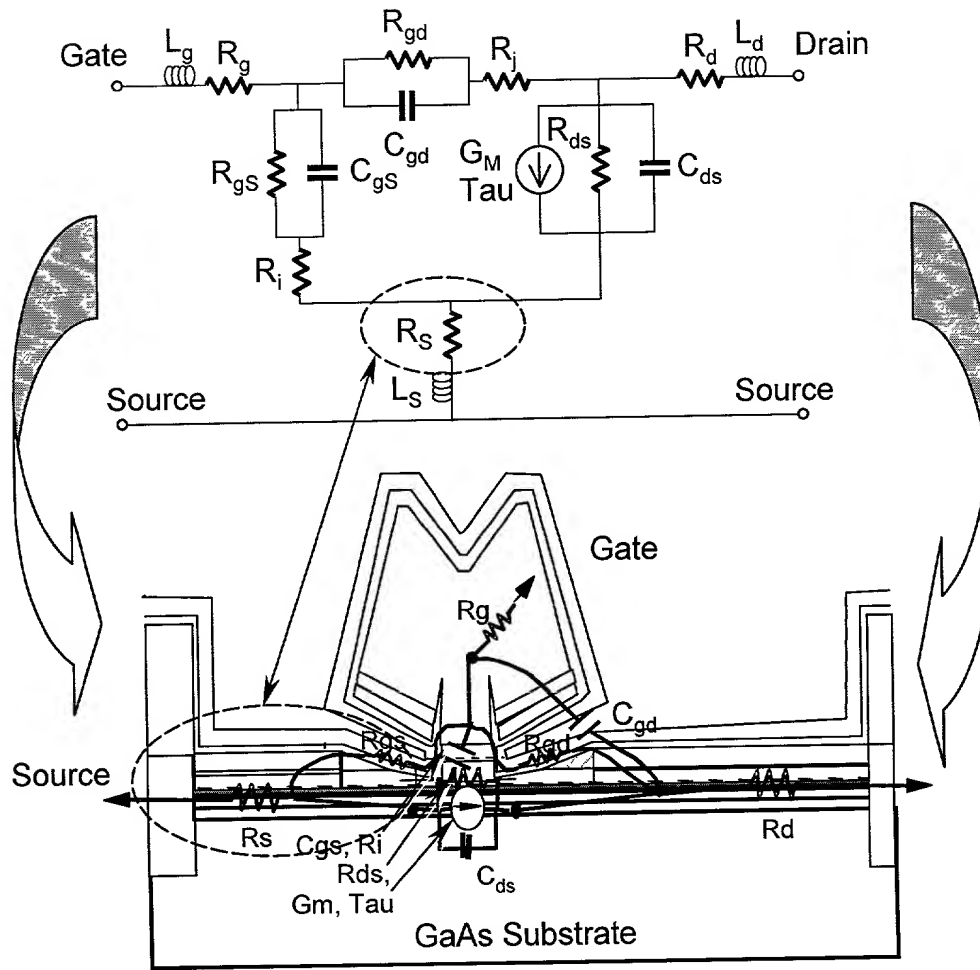


Figure 8

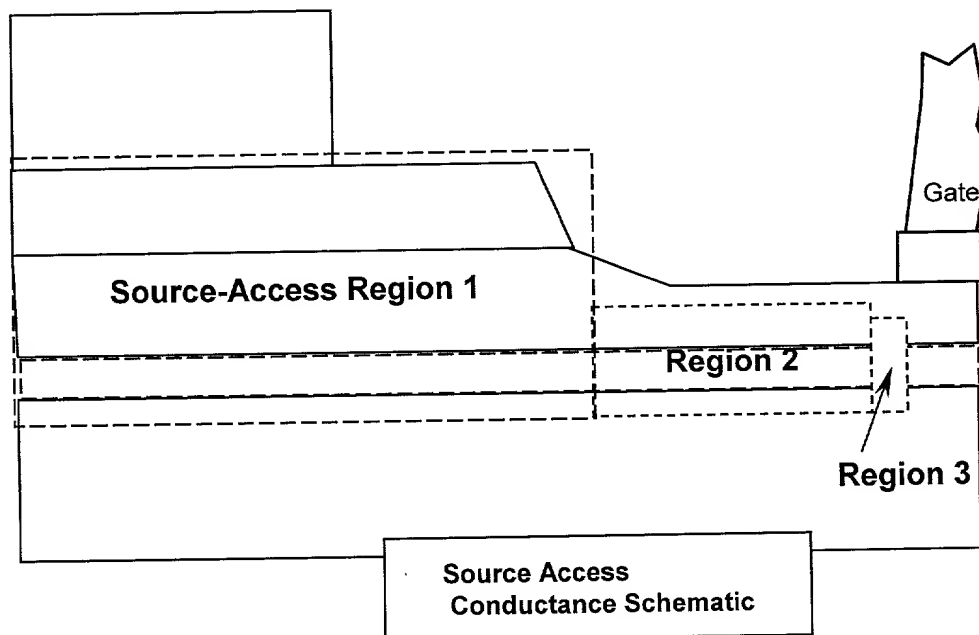


Figure 9

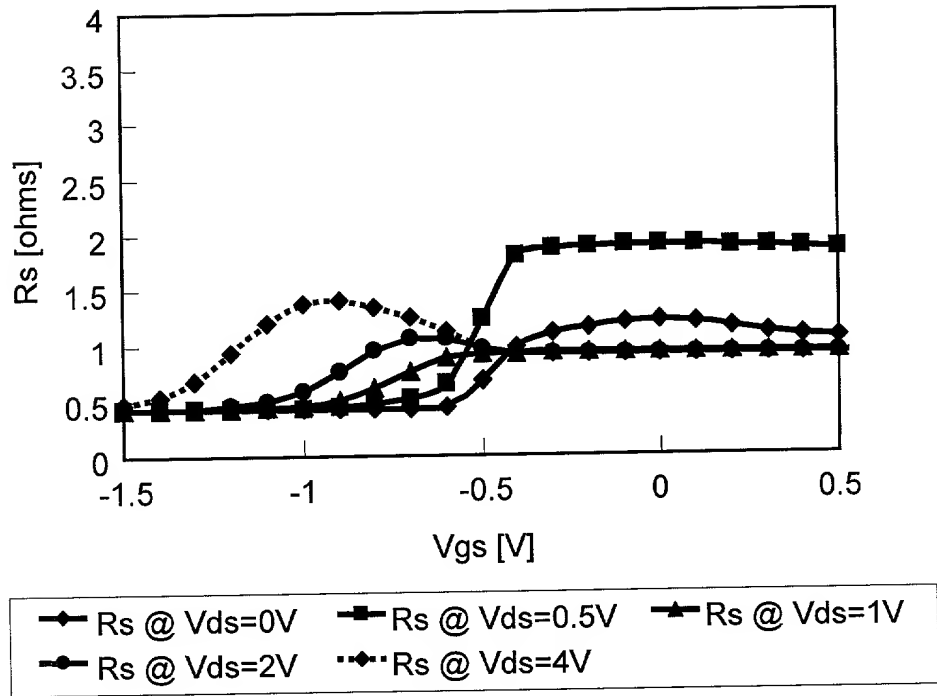


Figure 10A

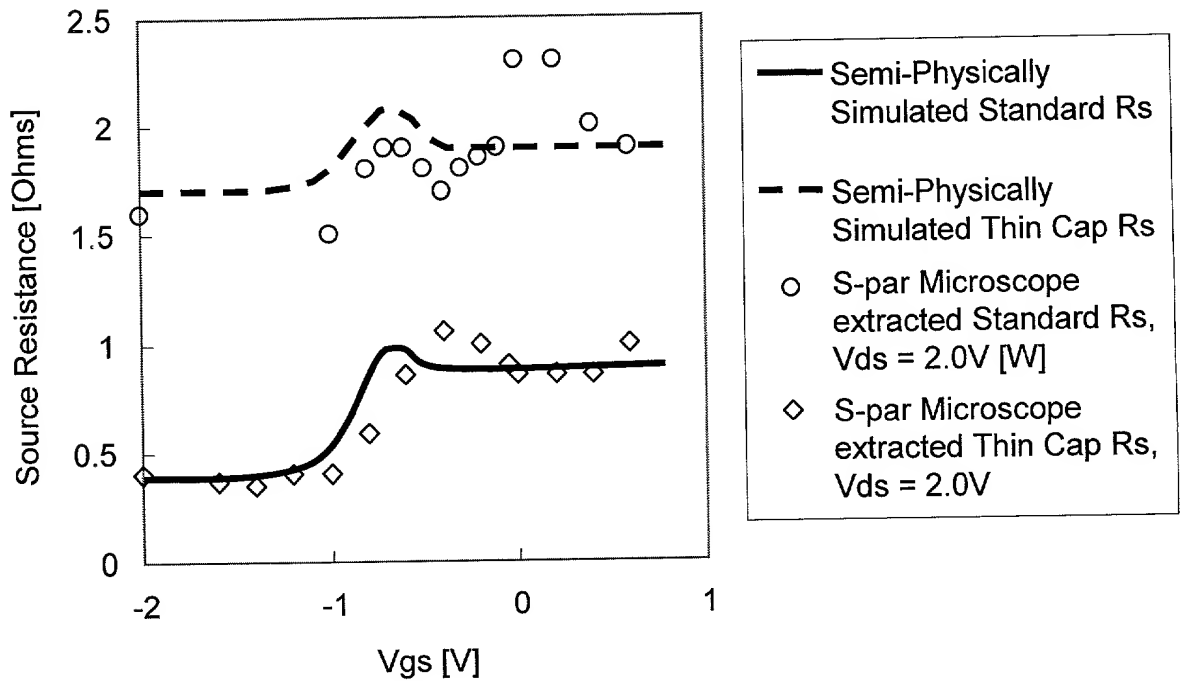


Figure 10B



TOP SECRET

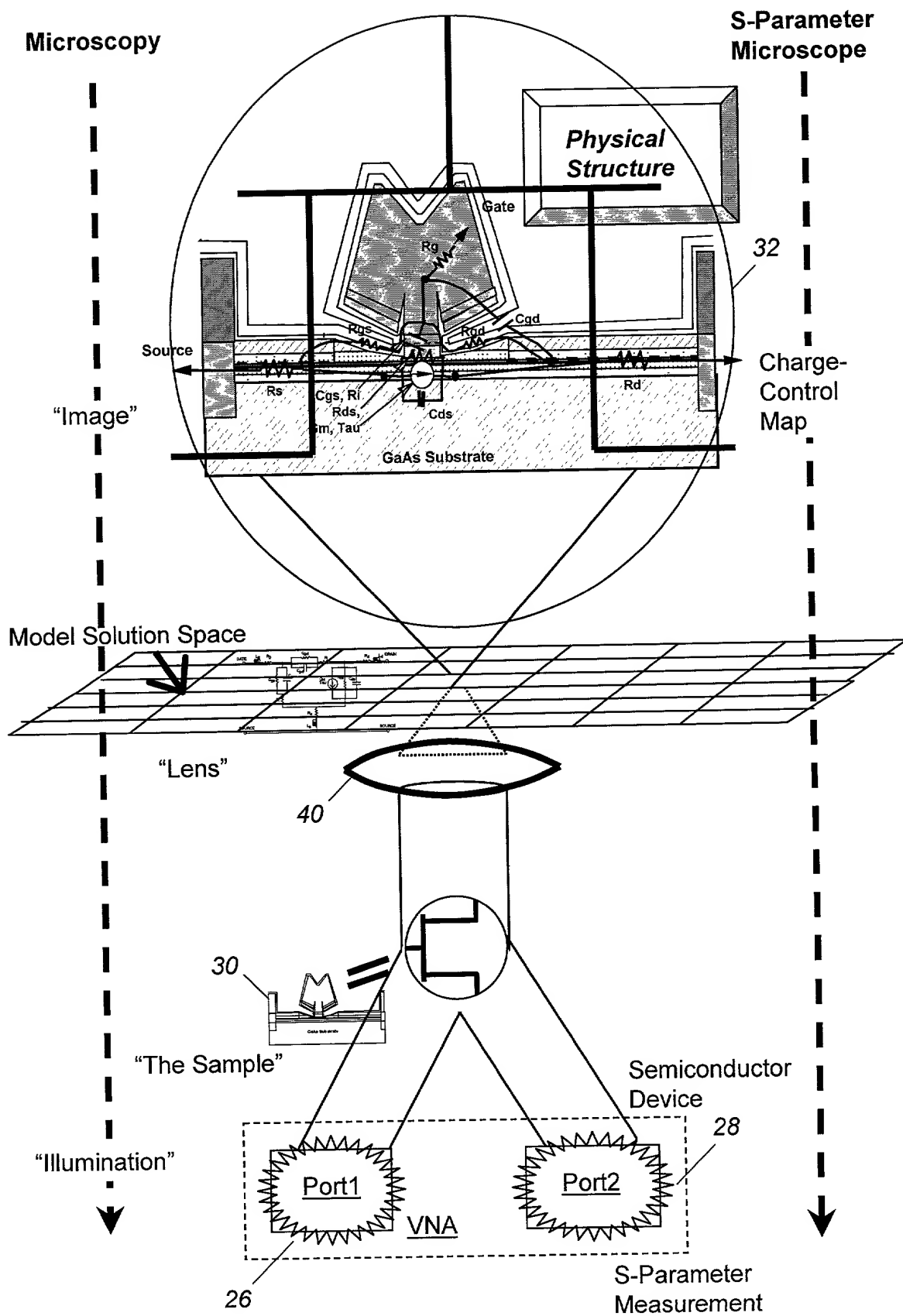


Figure 11

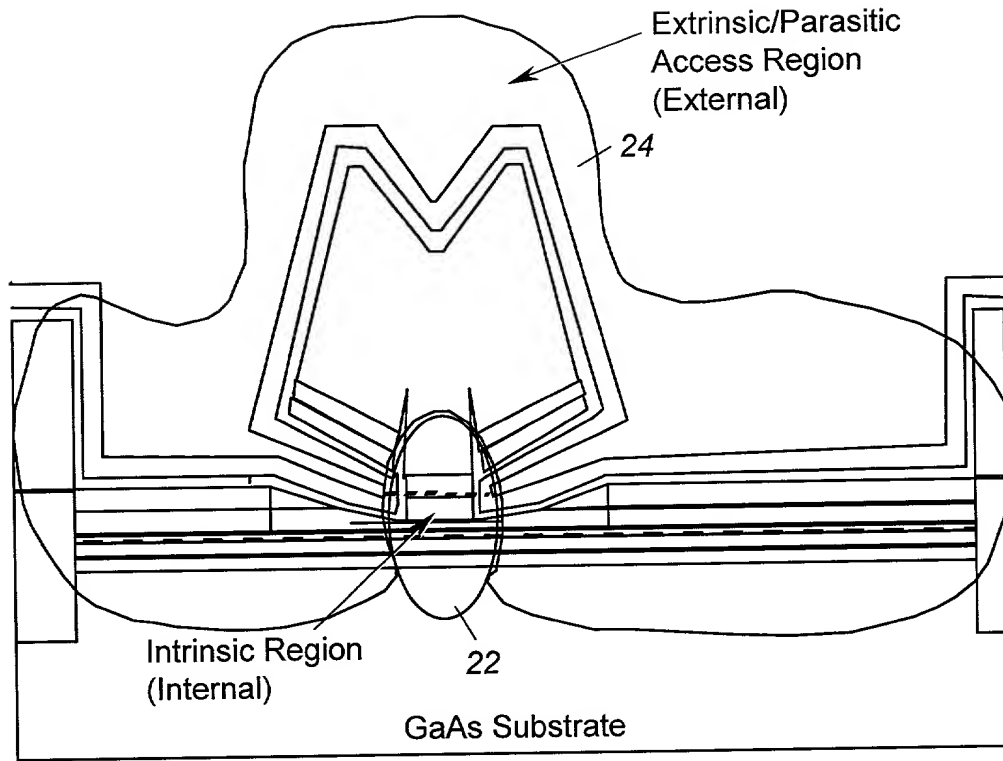


Figure 12



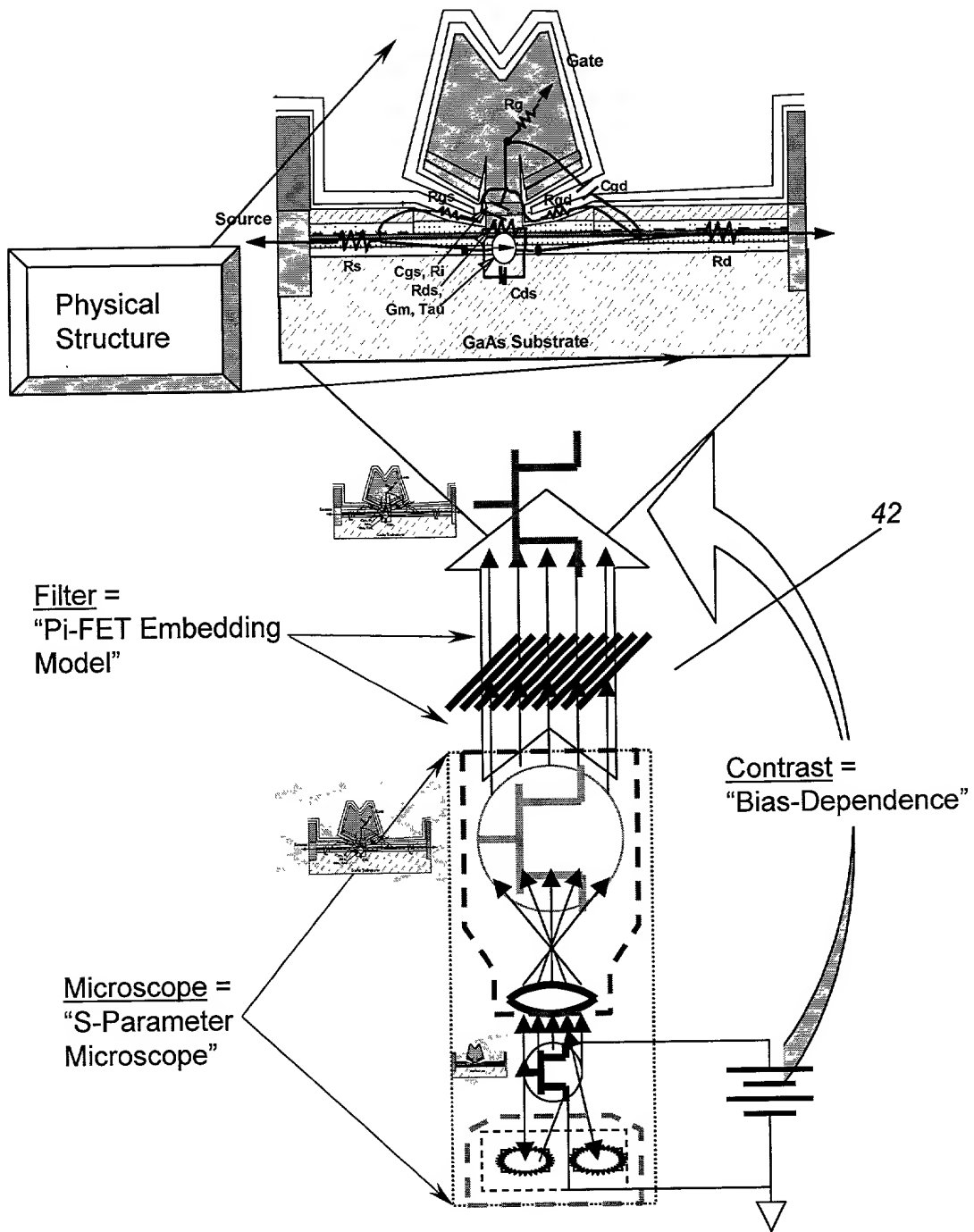


Figure 15

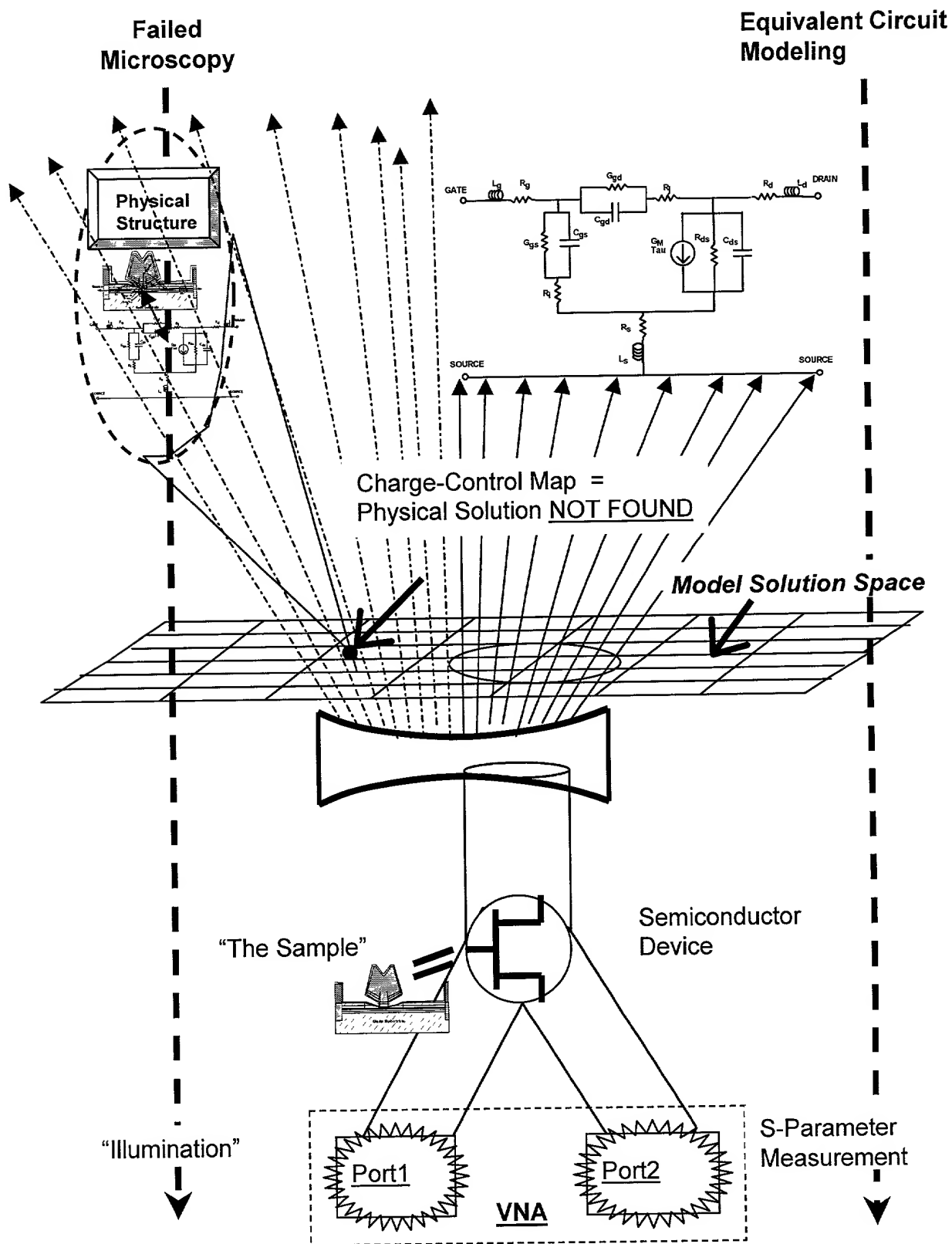


Figure 16

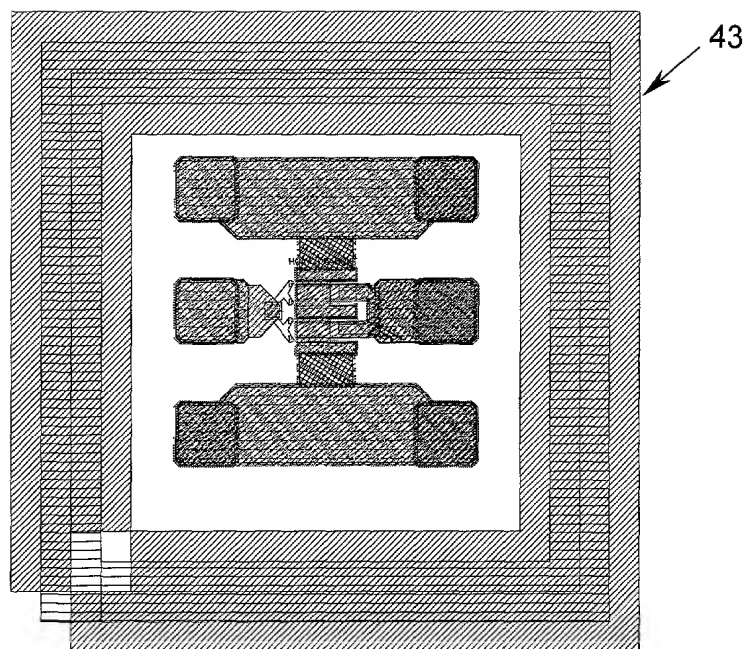


Figure 17

### $I_{ds}$ vs $V_{ds}$ for the Measured HEMT Device

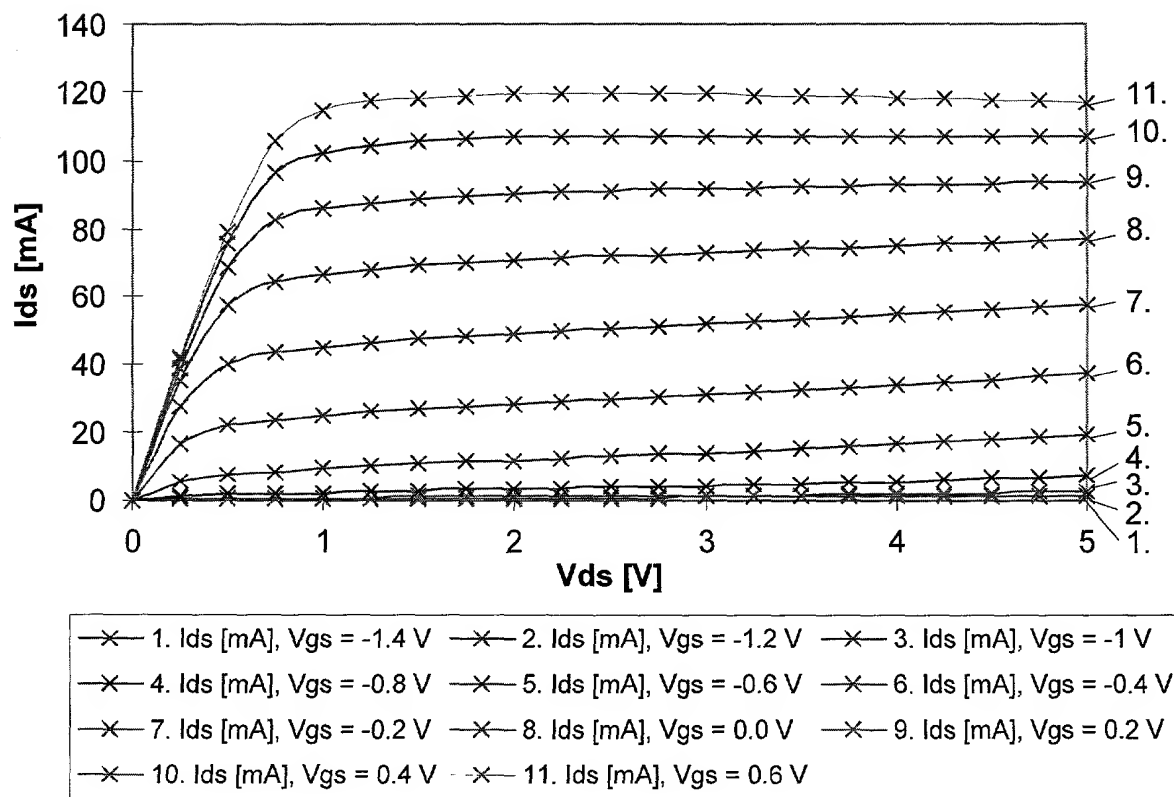
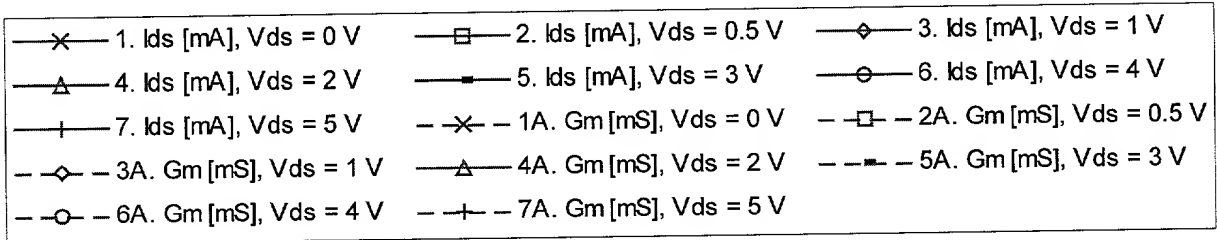
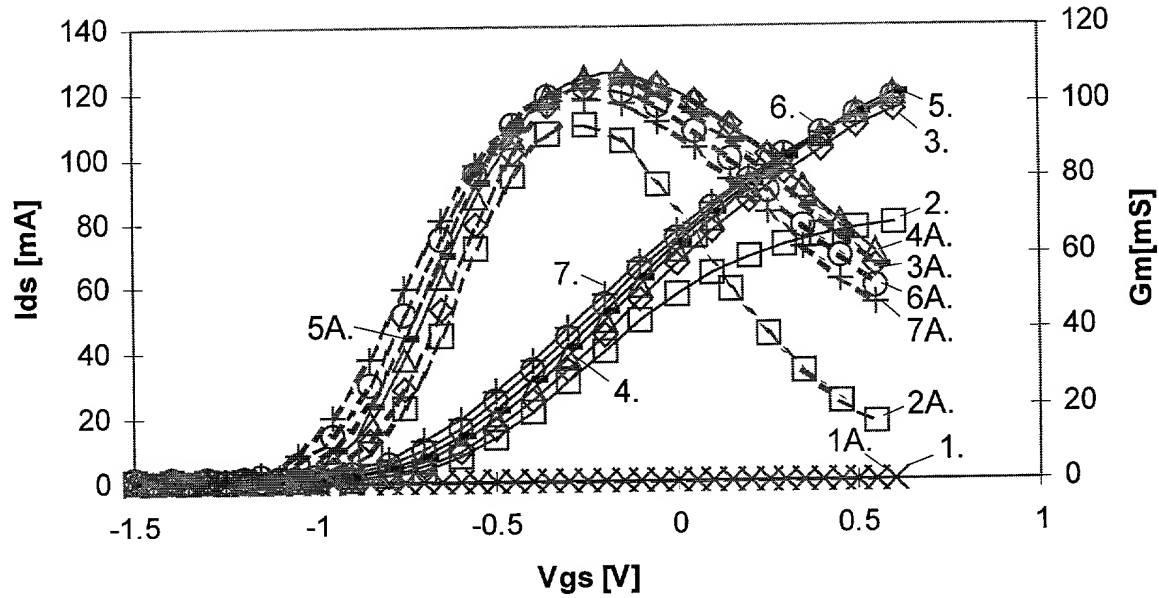
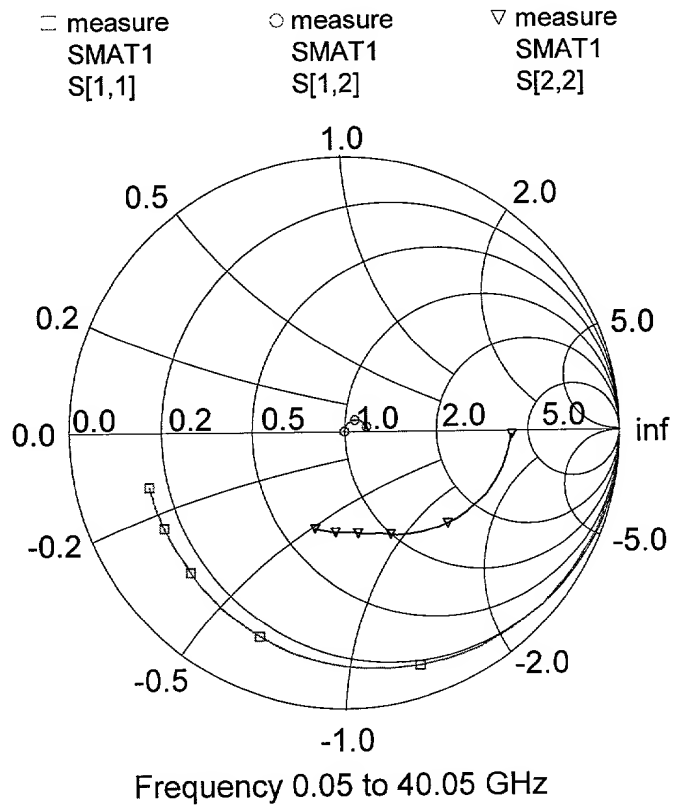


Figure 18

**Ids and Gm vs Vgs for the Measured Device**



**Figure 19**



**Figure 20**

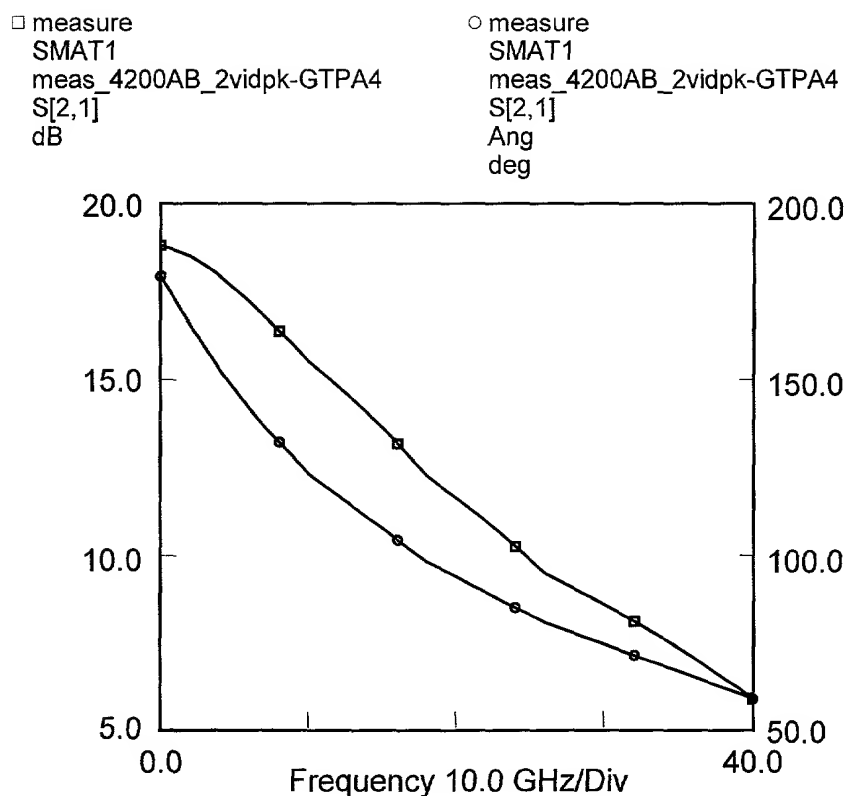


Figure 21

### Intrinsic Device Source Resistance vs Gate Bias 0.15 $\mu\text{m}$ P3H4 HEMT

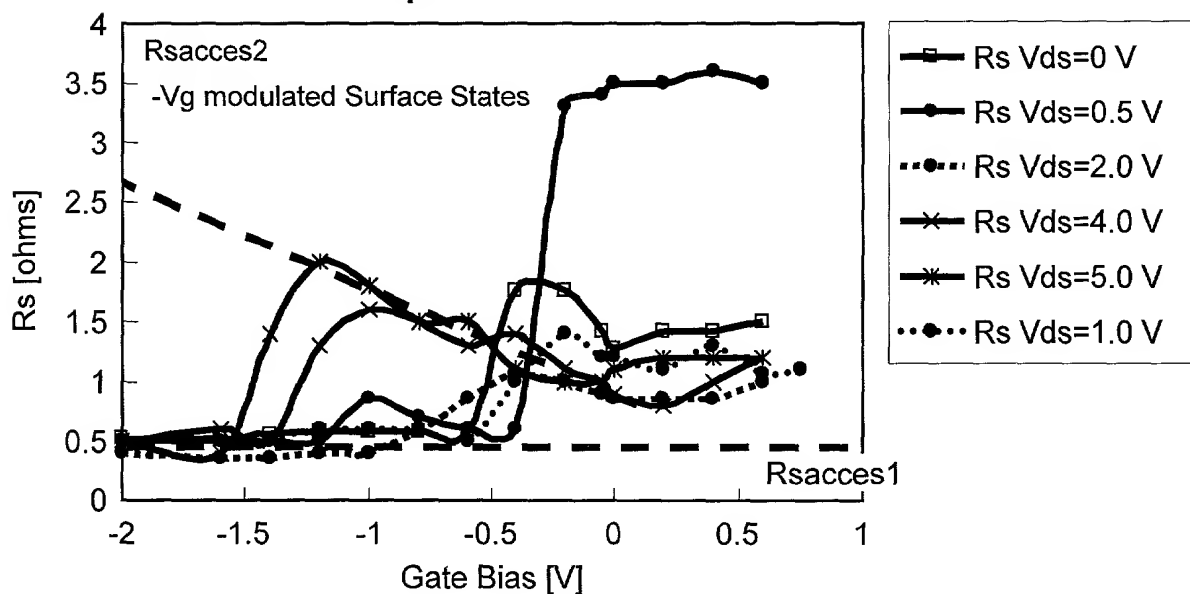


Figure 22



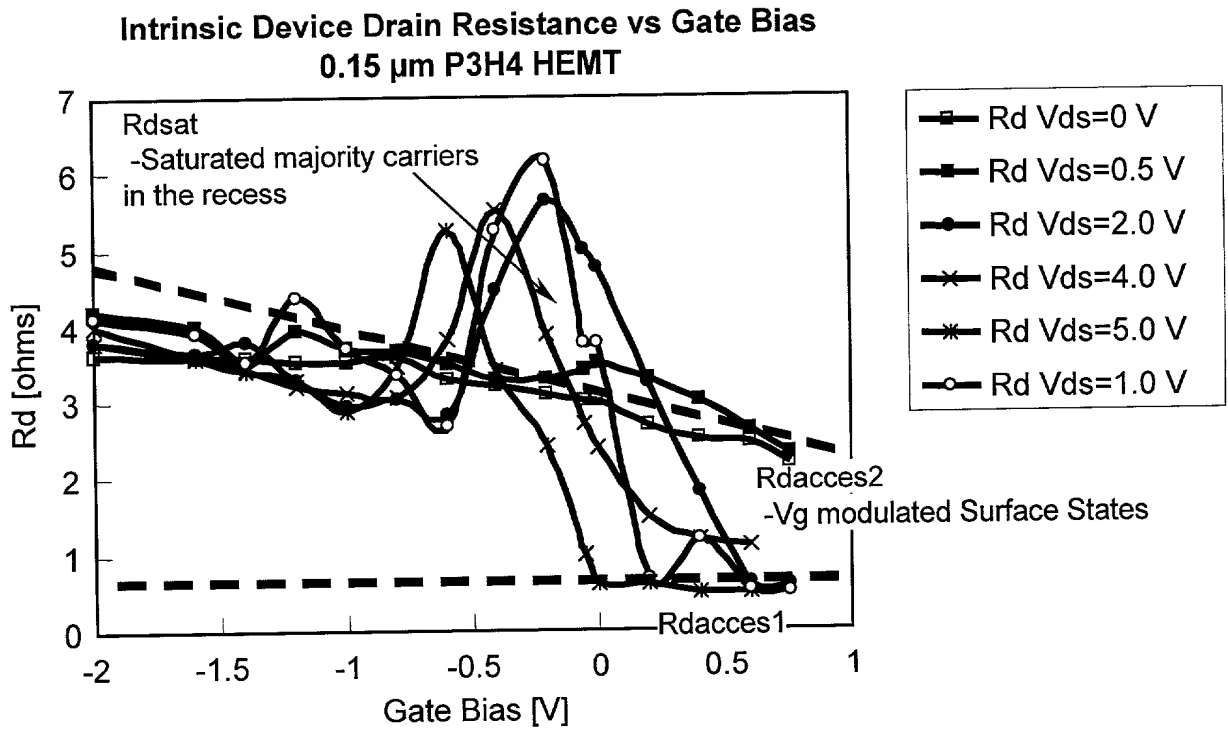


Figure 23

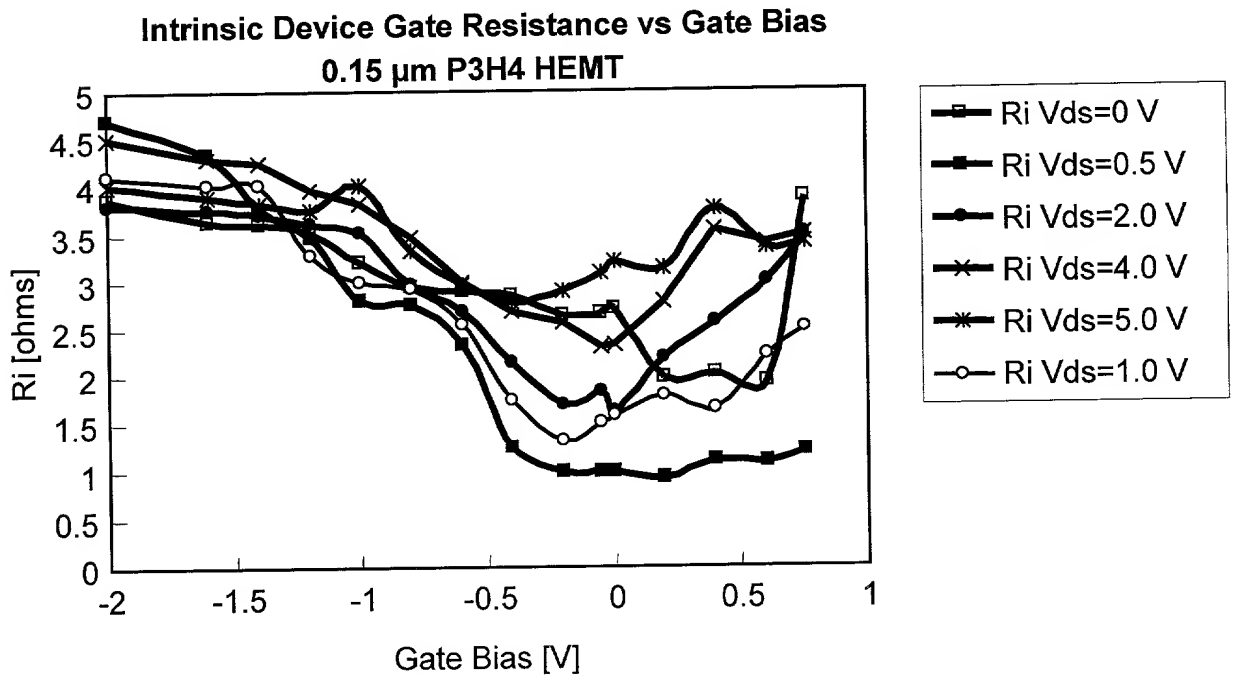
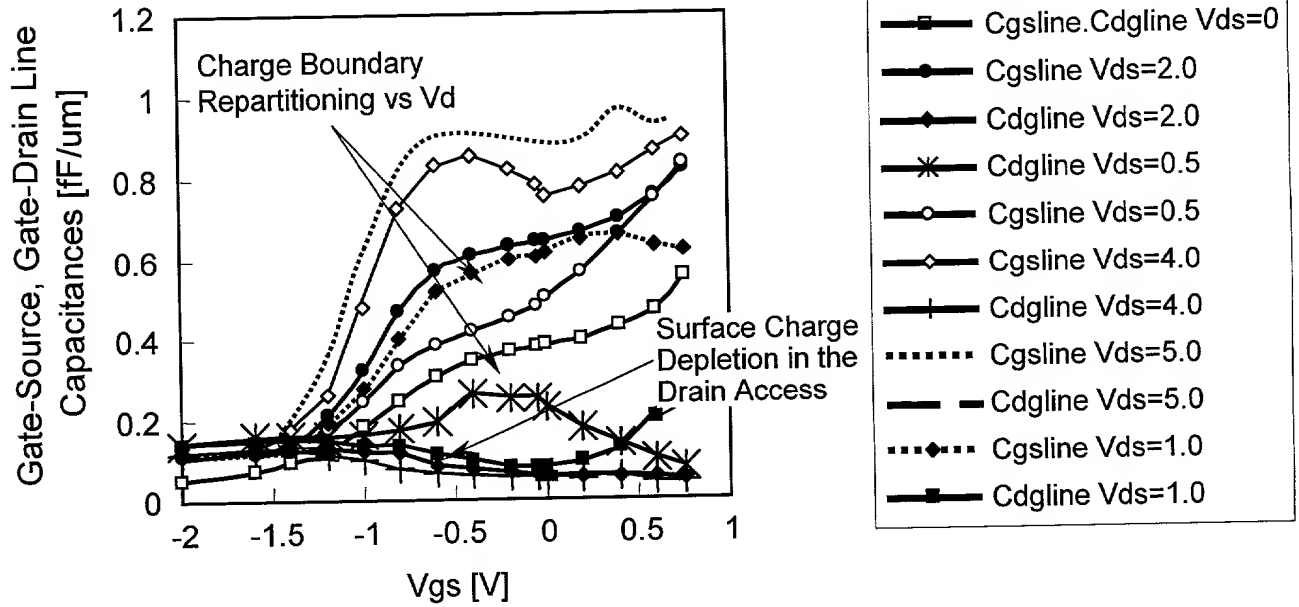


Figure 24

# **Intrinsic Device Line Capacitance vs Gate Bias** **0.15 $\mu$ m P3H4 HEMT**



**Figure 25**

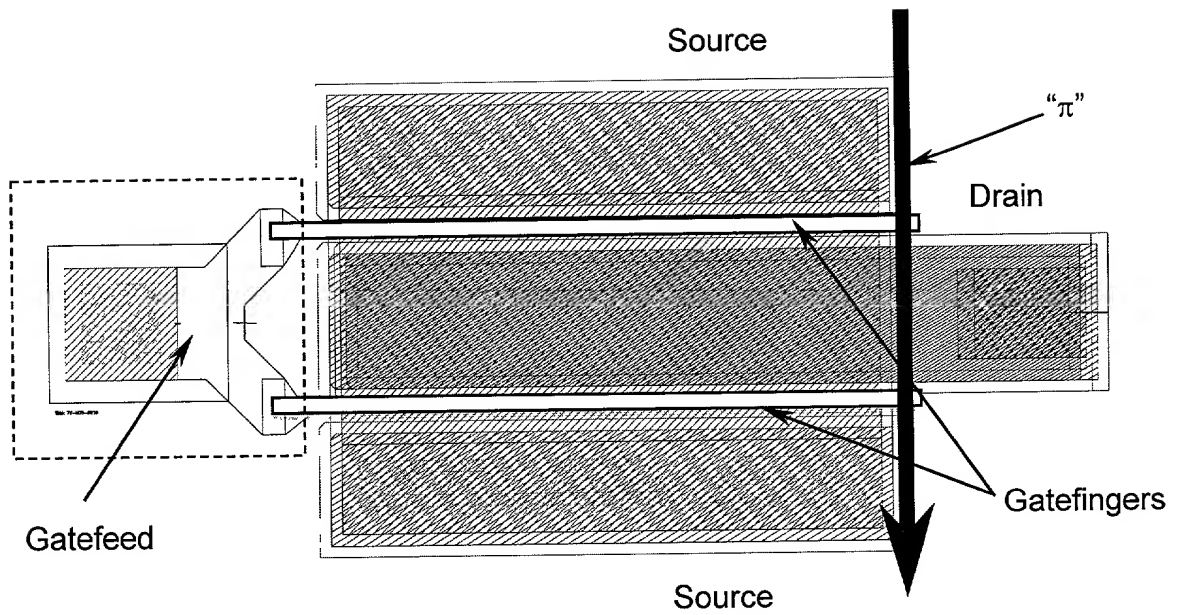


Figure 26

09840500 042301

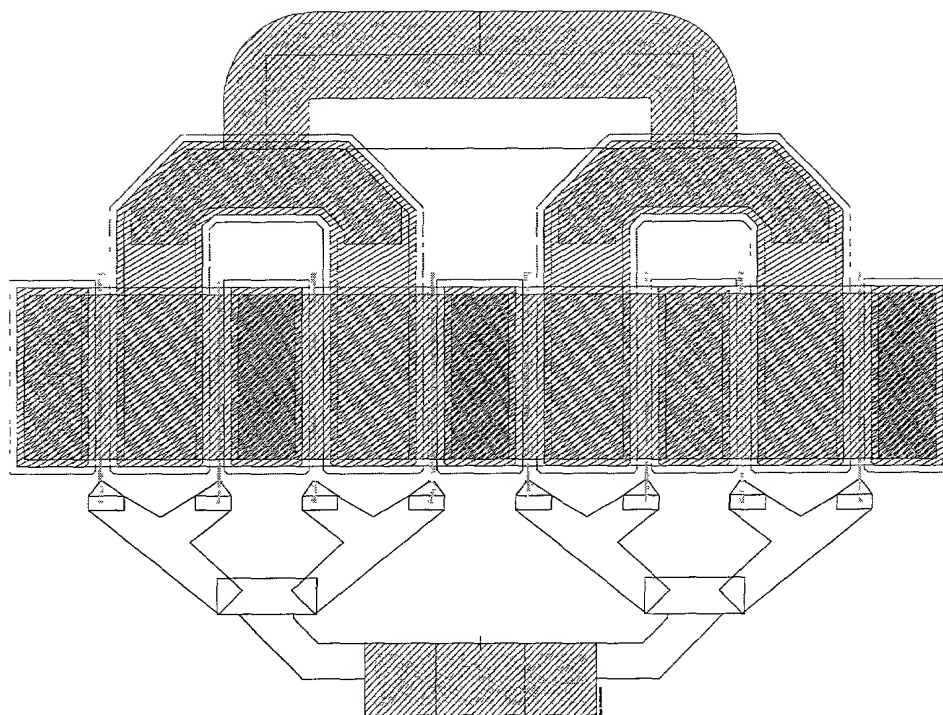


Figure 27

**Model Construction**

- 1) Off-Mesa, or Boundary Parasitic Model
- 2) Inter-electrode Parasitic Model
- 3) On-Mesa Parasitic Model
- 4) Intrinsic Model

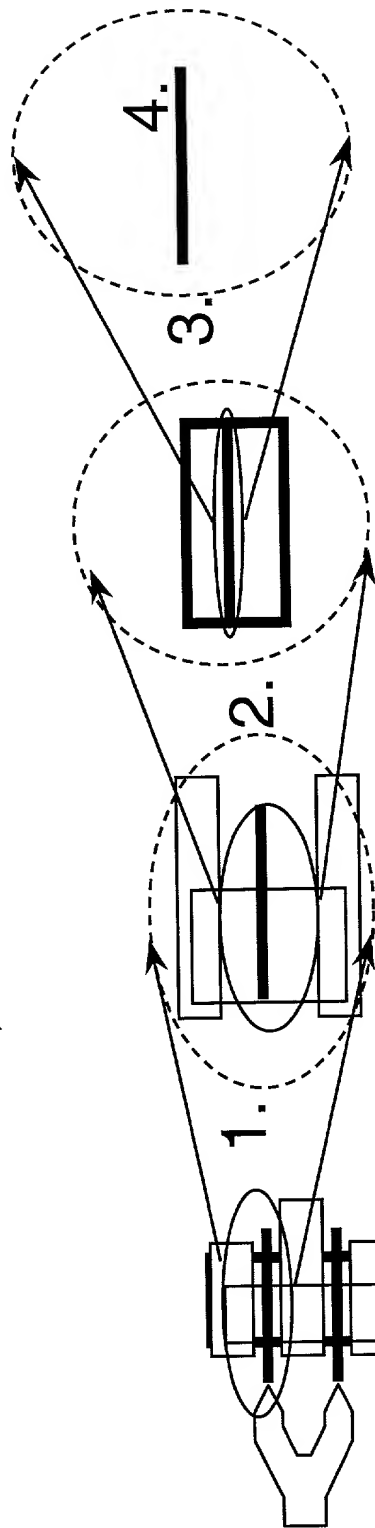


Figure 28

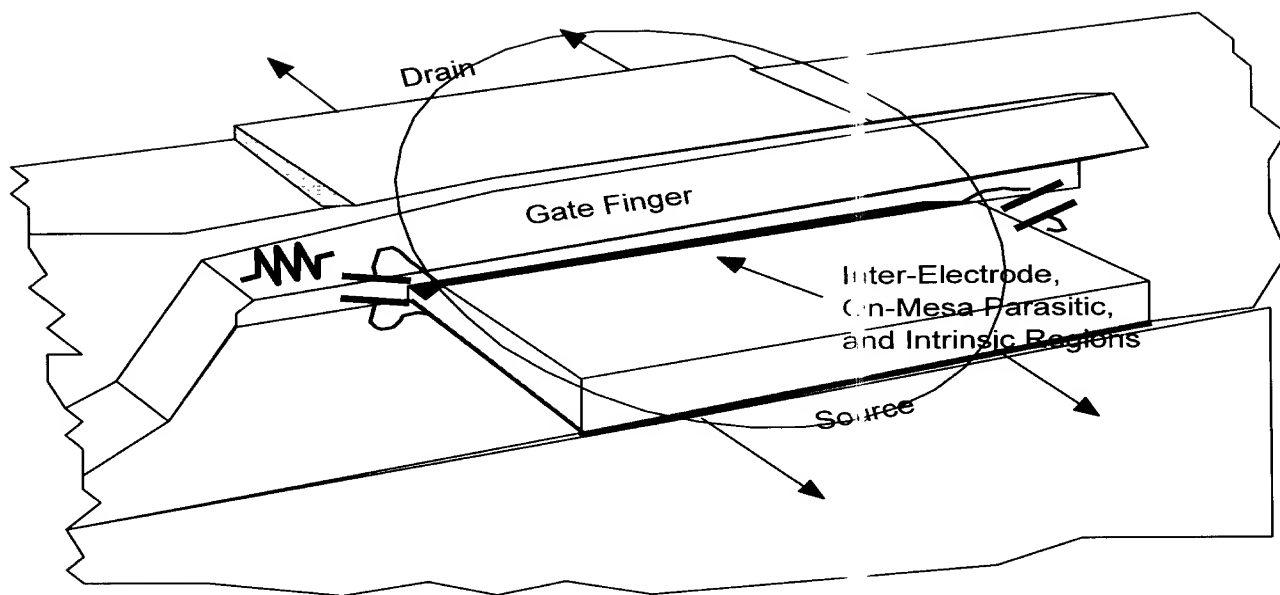


Figure 29

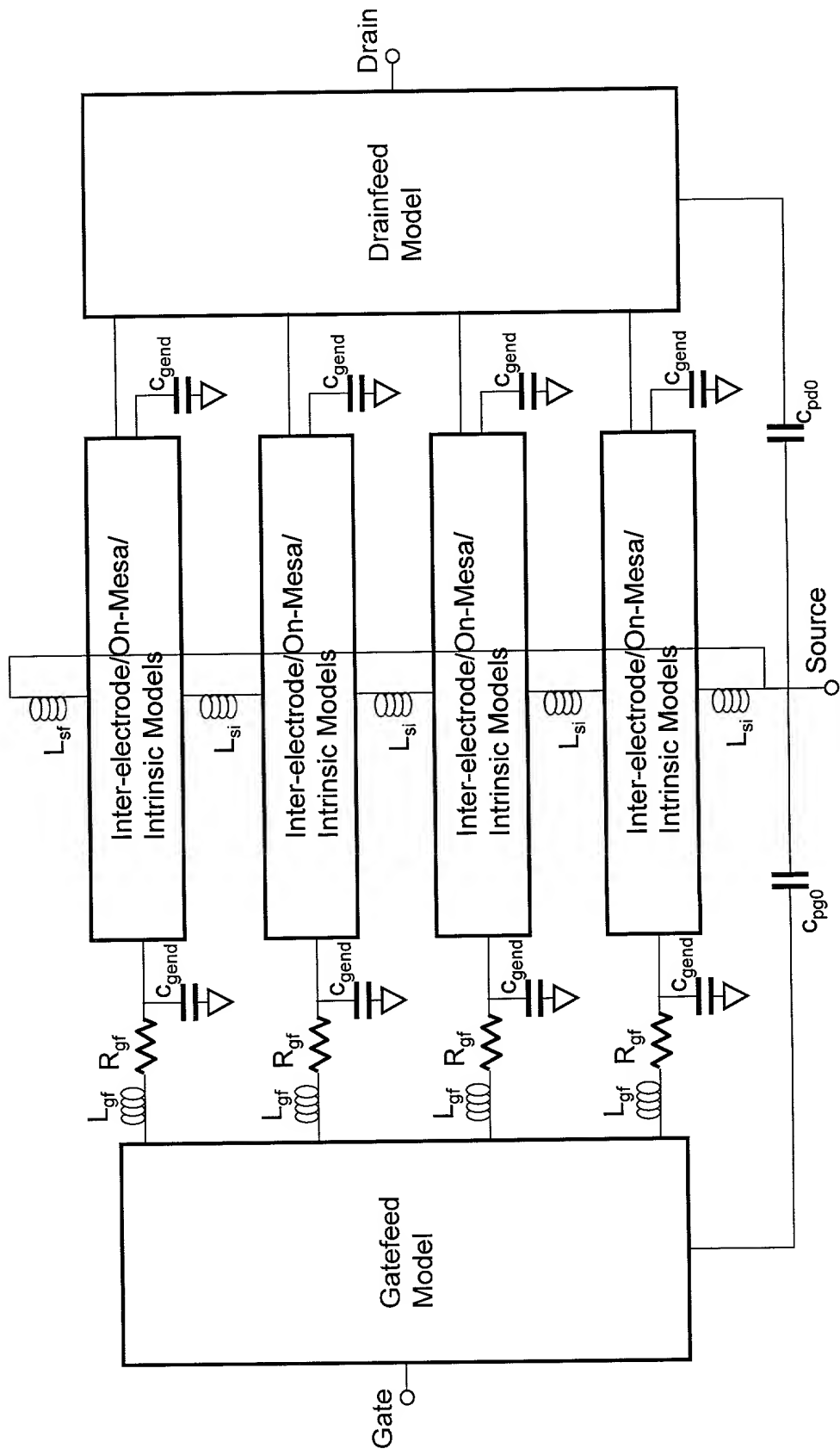


Figure 30

**Figure 31**



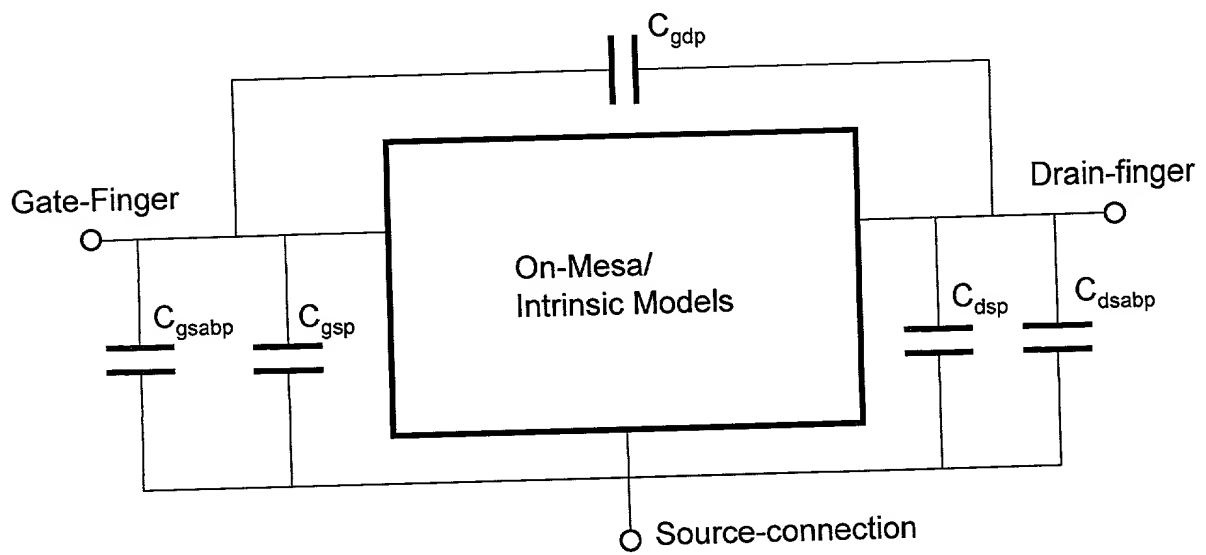


Figure 32

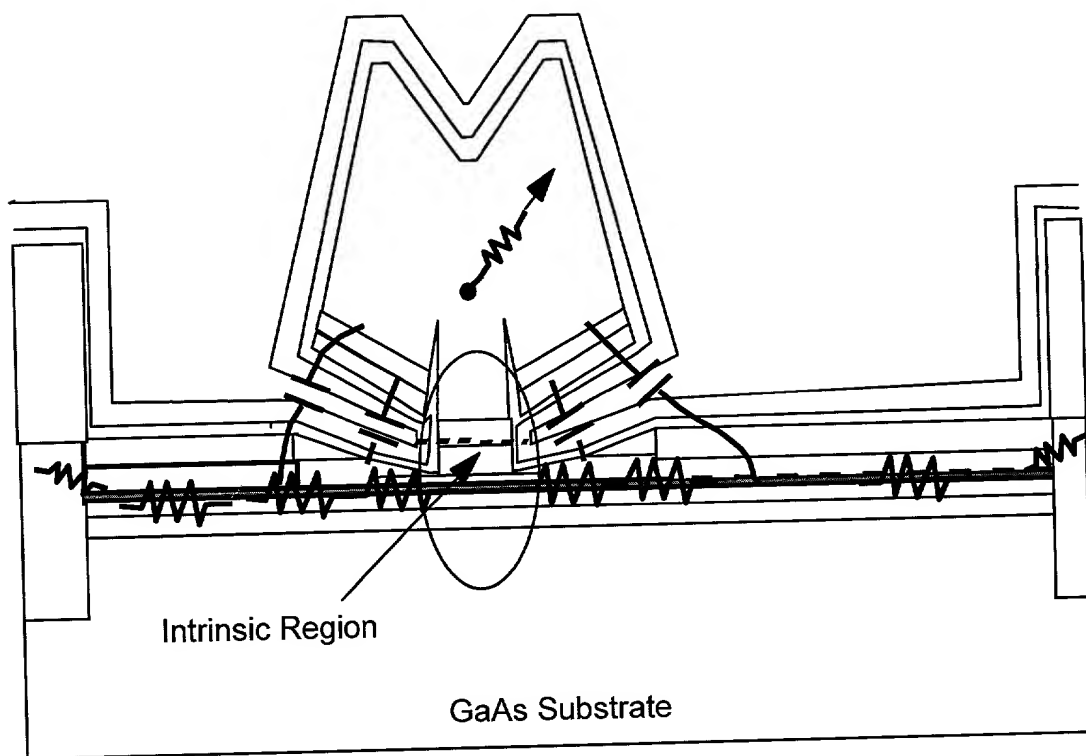


Figure 33

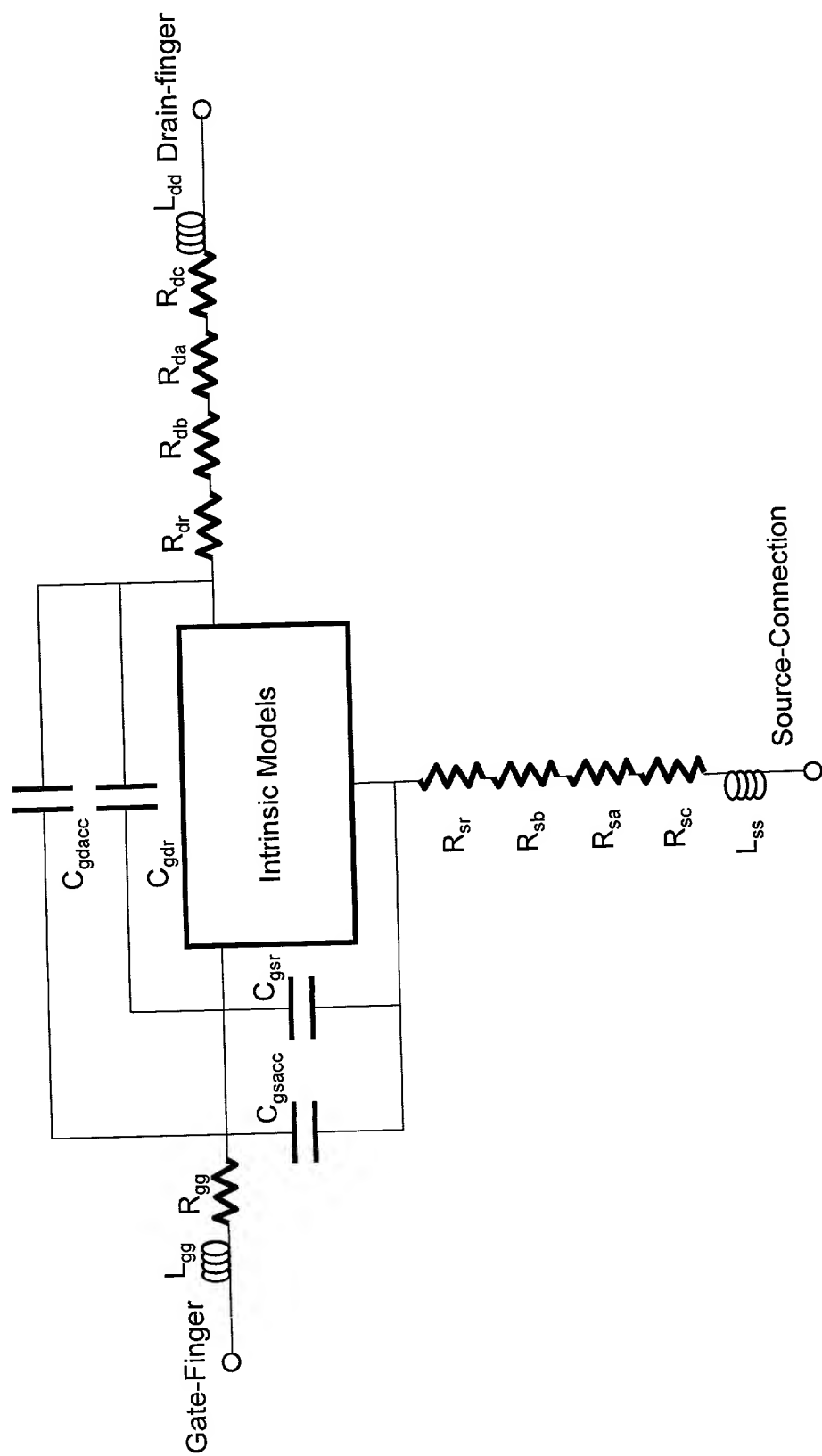


Figure 34



\* 1998      \*\* 1997-1998      \*\*\* 1996-1997      \*\*\*\* 1995-1996

TECHNICAL DOCUMENT

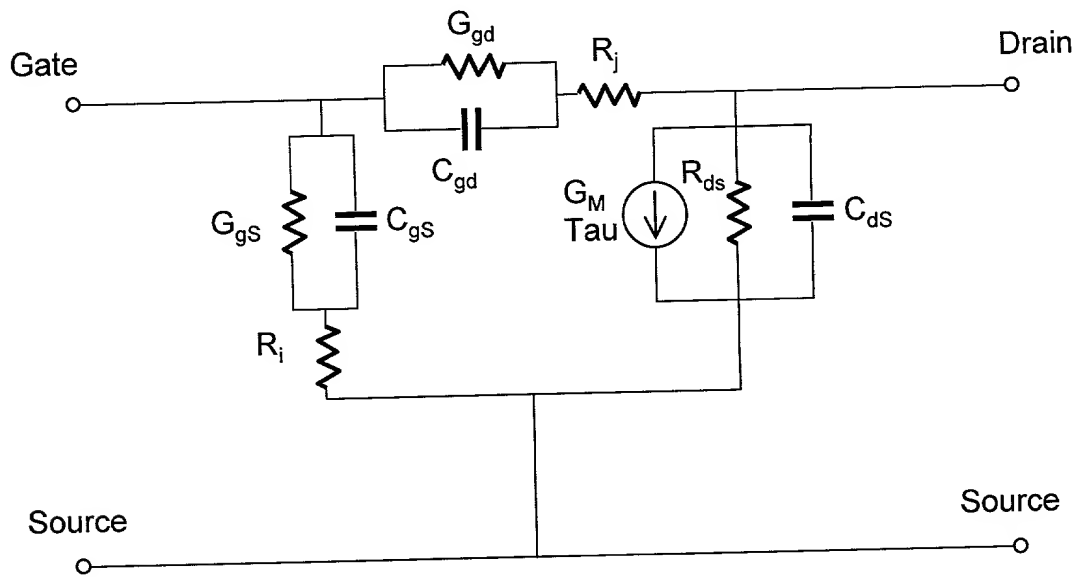


Figure 36

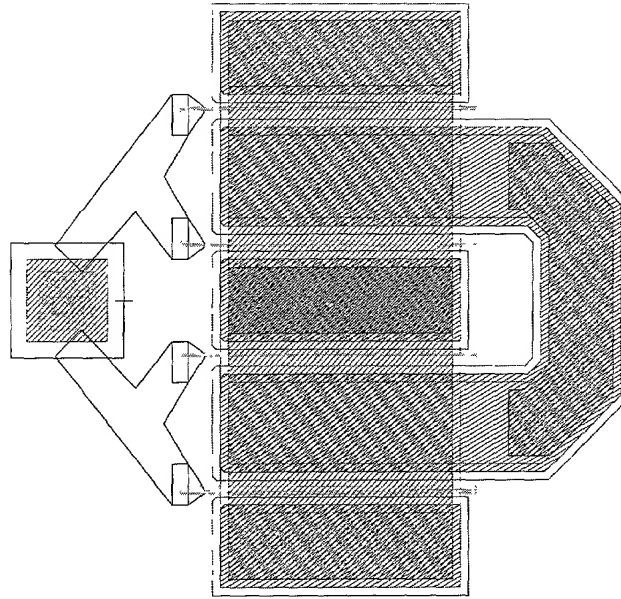


Figure 37A

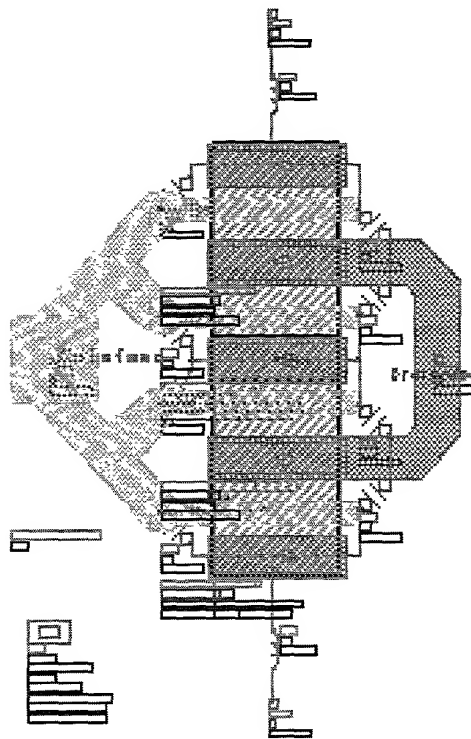


Figure 37B

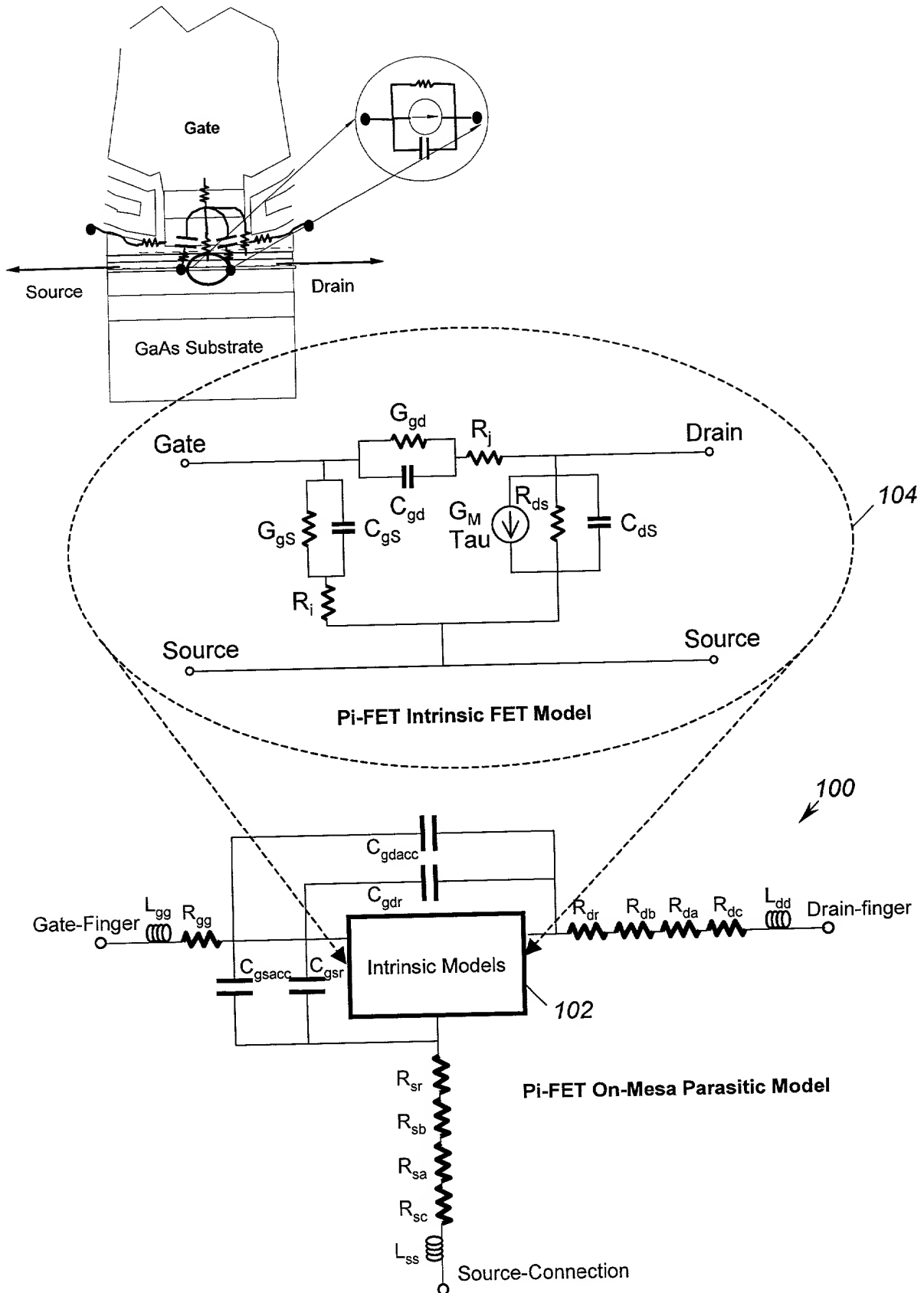


Figure 38

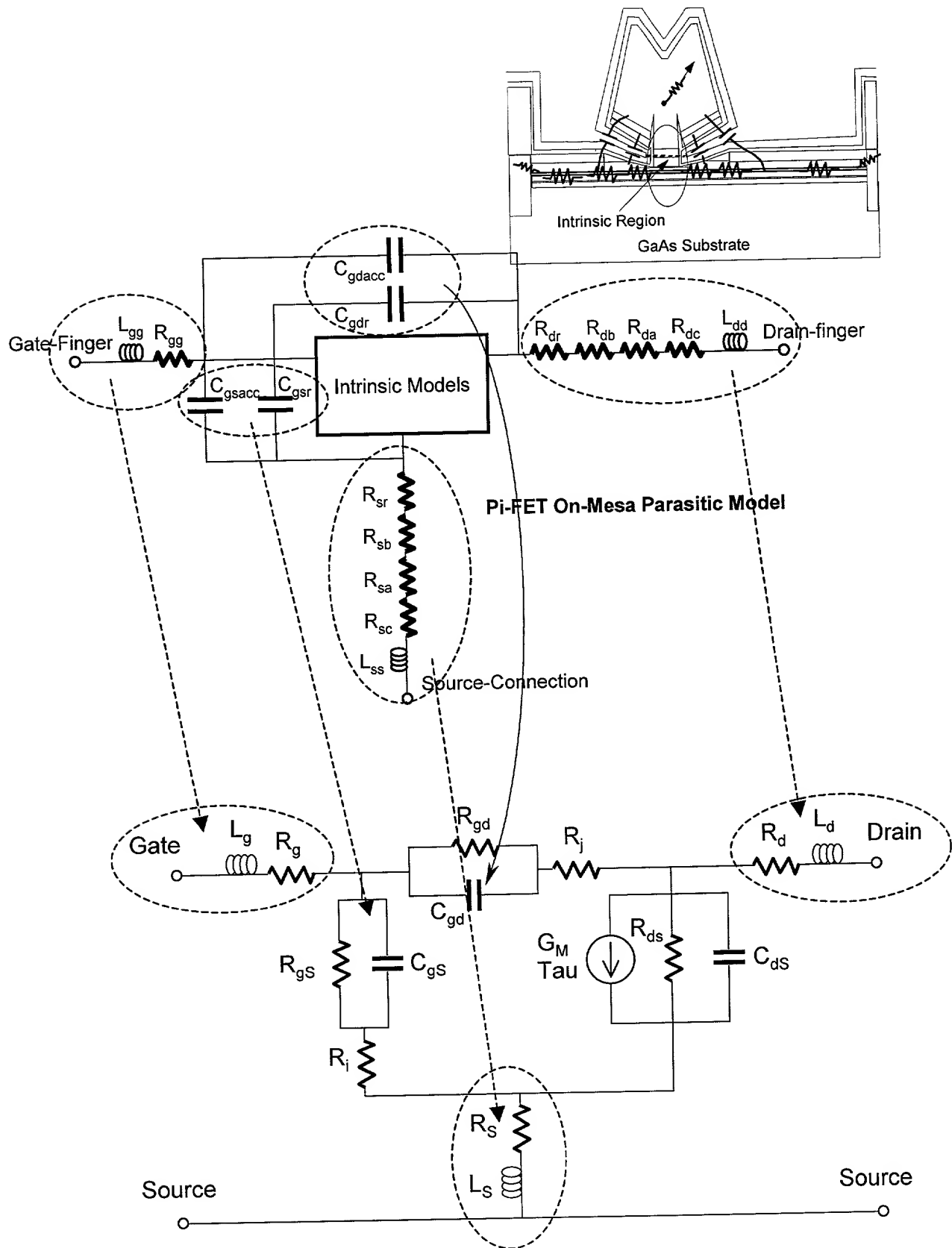


Figure 39





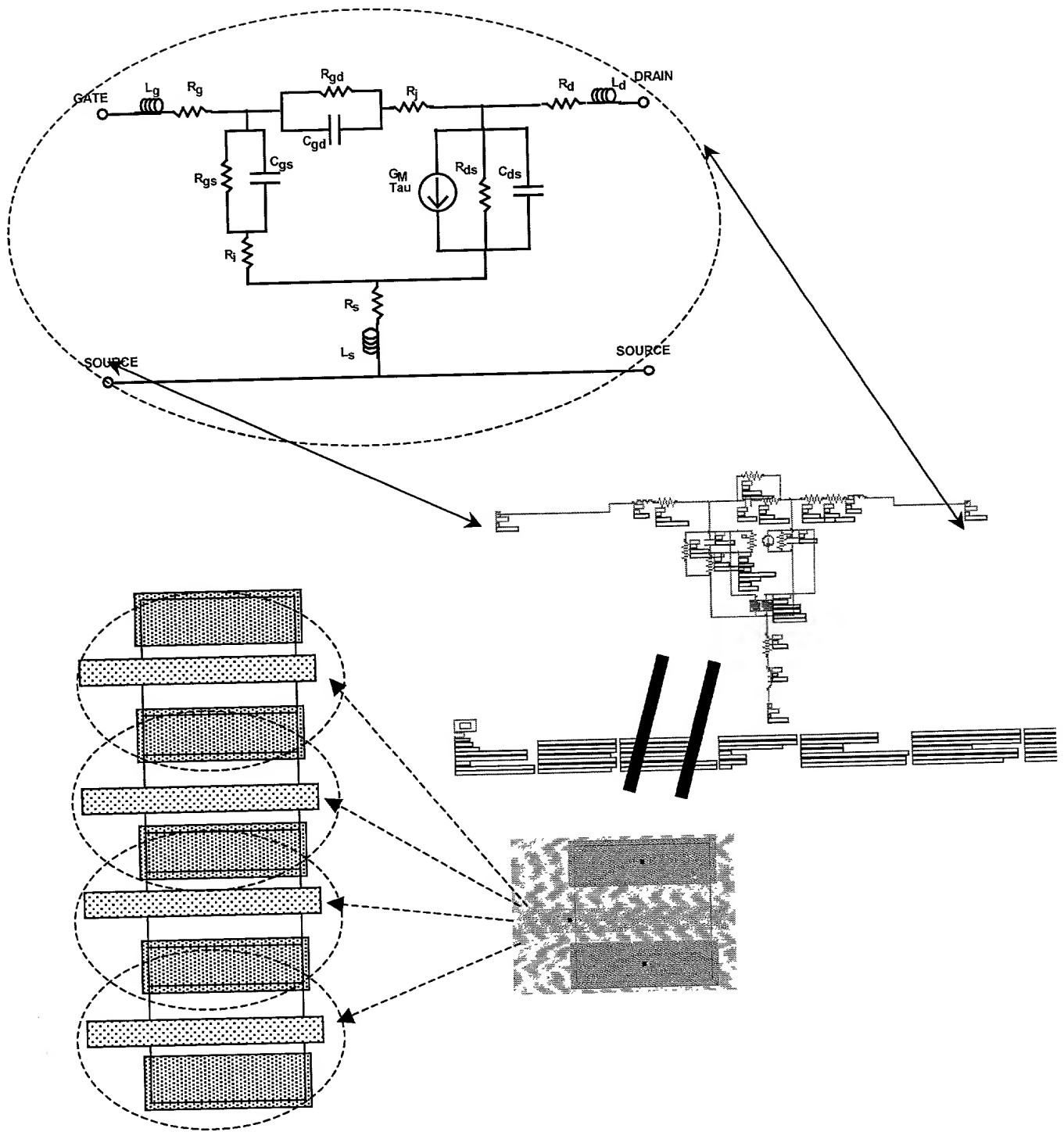


Figure 41

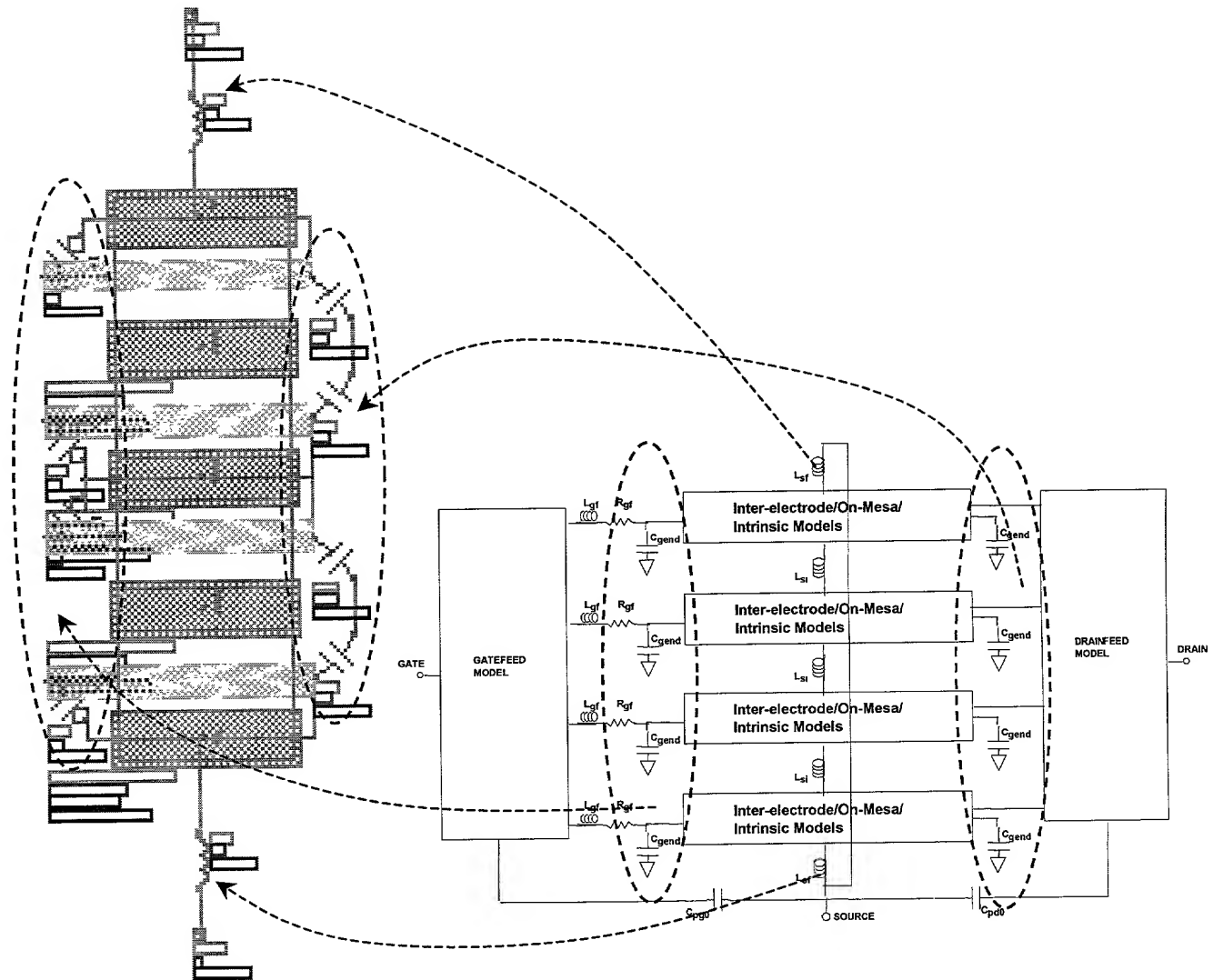


Figure 42

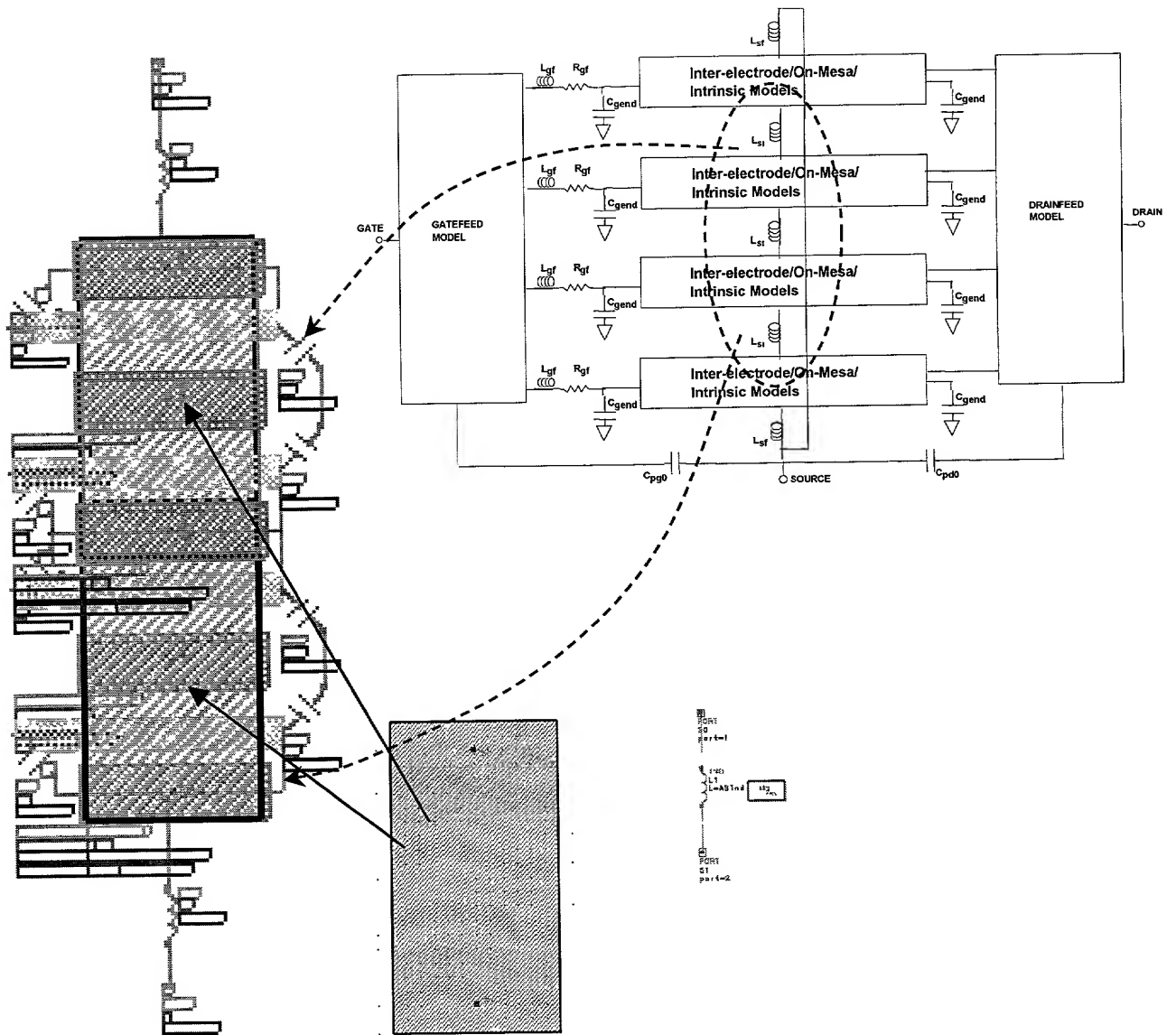
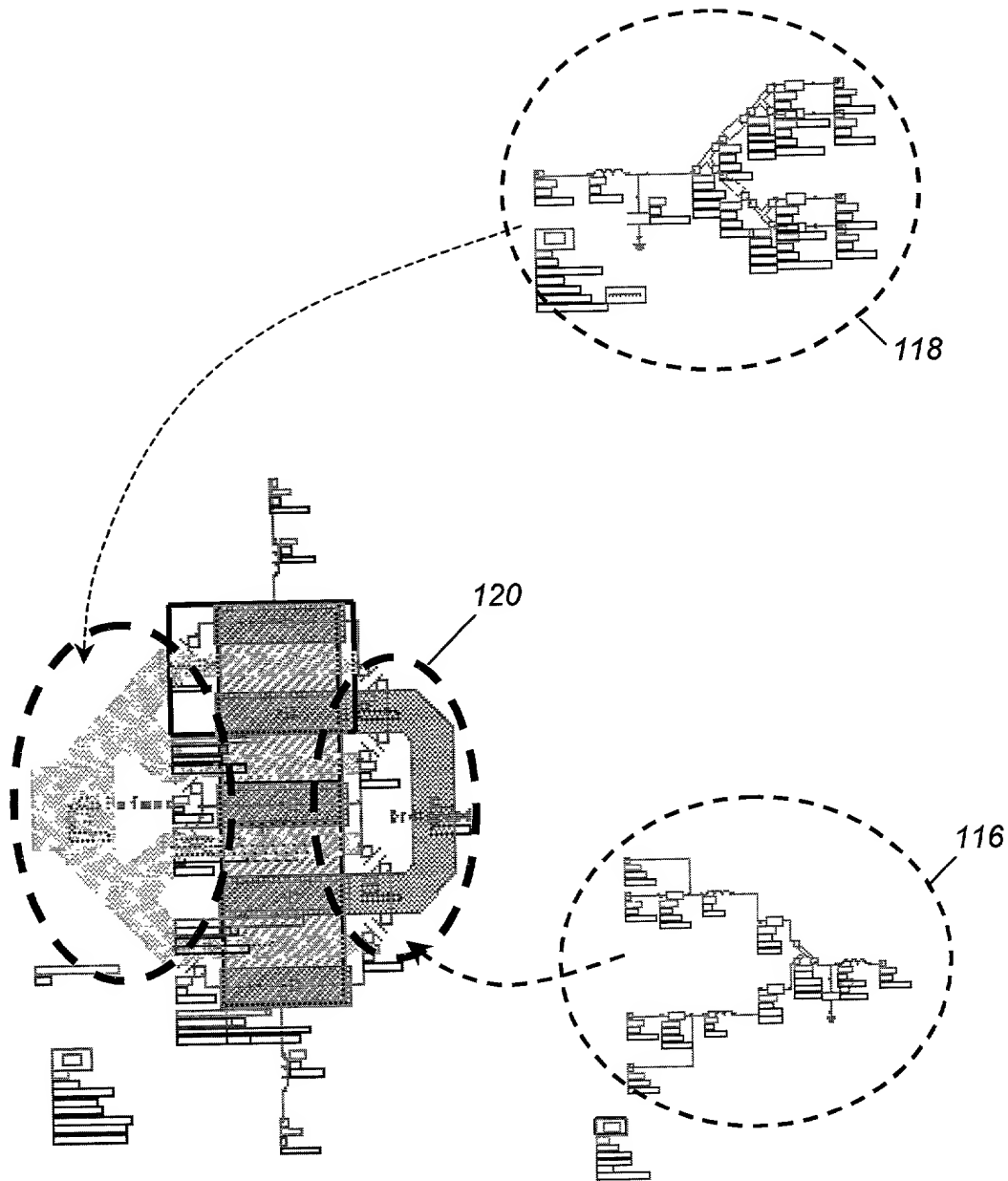
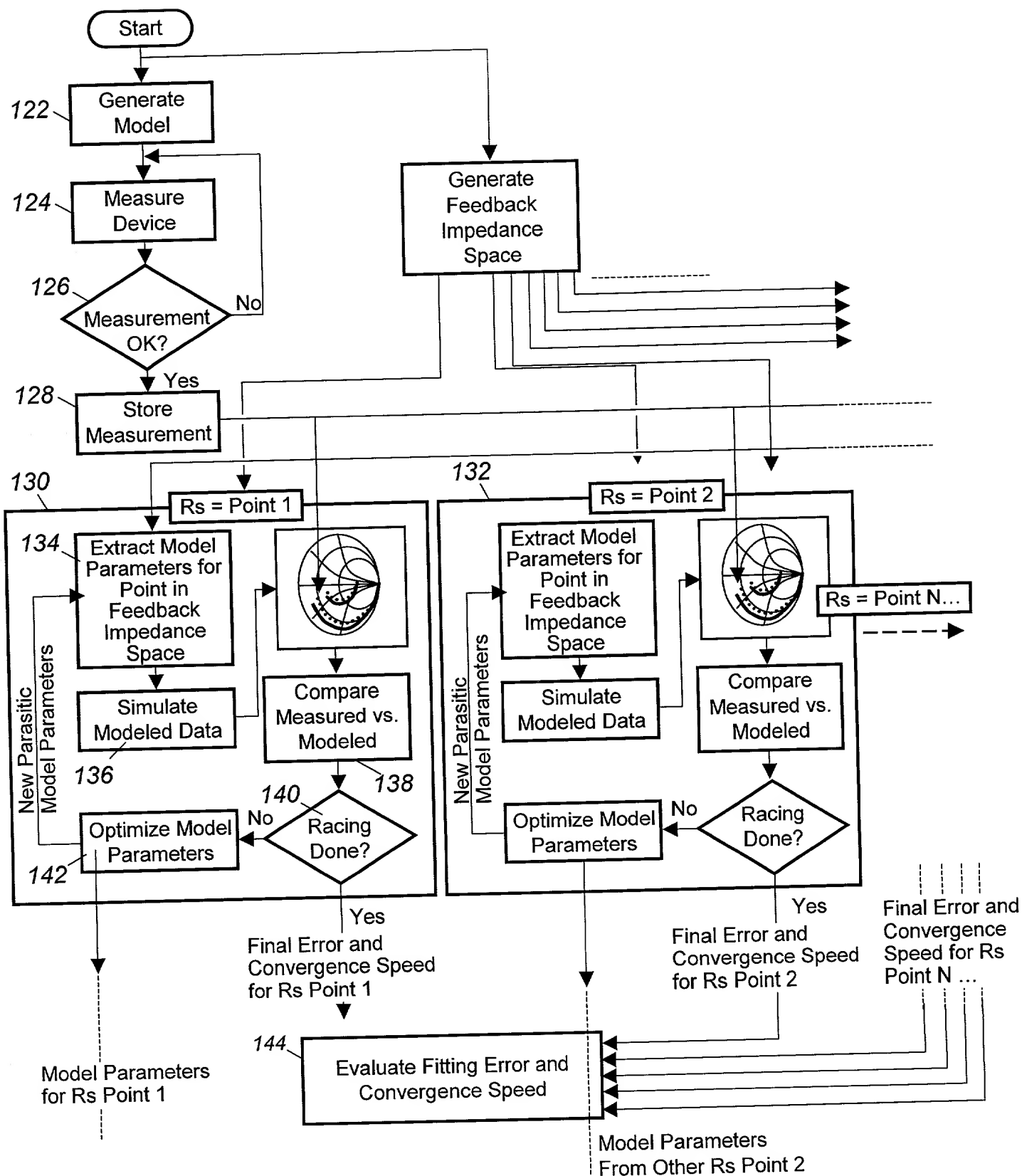


Figure 43



Implementation of the fifth level of embedding

Figure 44



**Figure 45A**

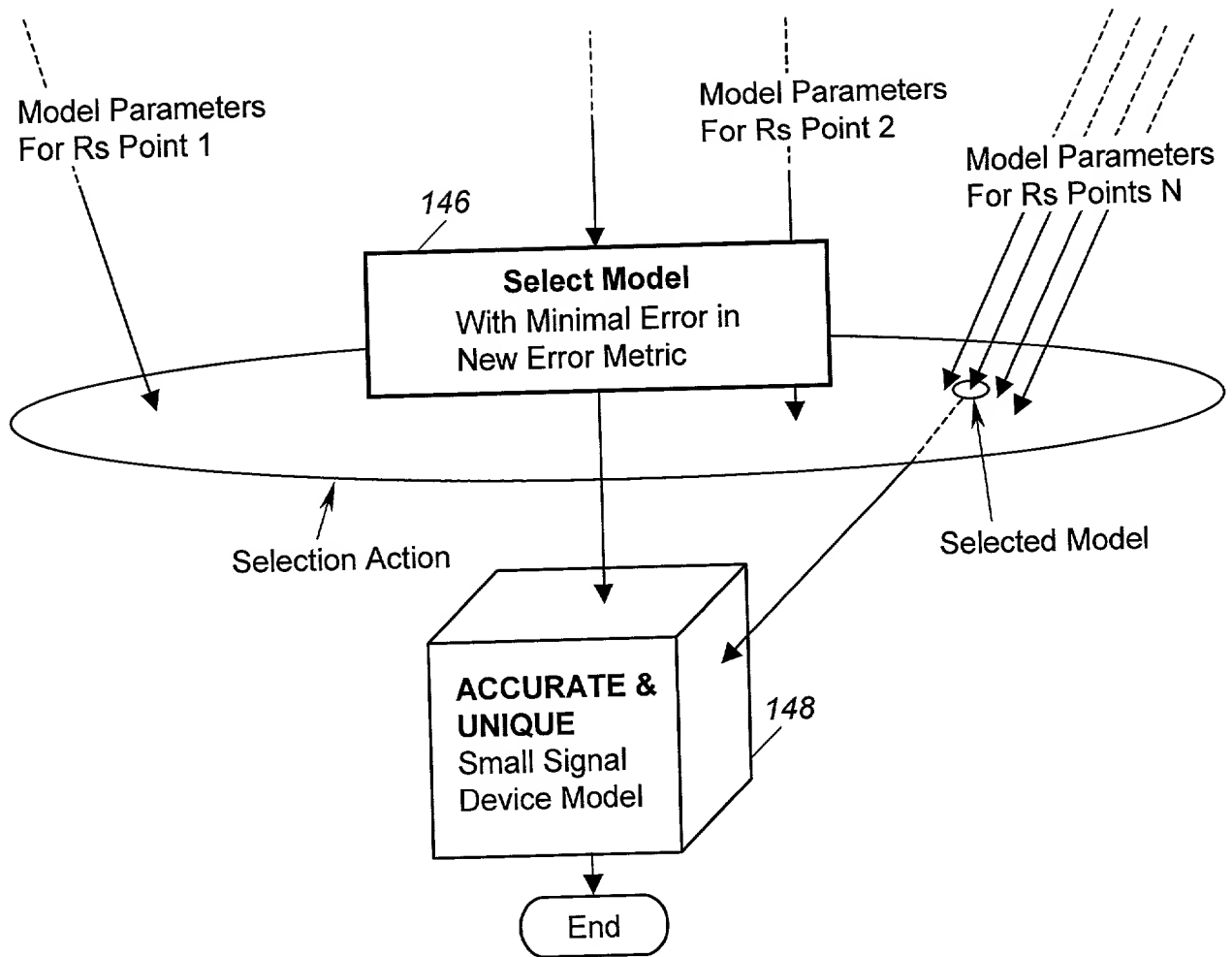


Figure 45B

Final Error vs RS Map for YYY-STATE 1coc\_\_

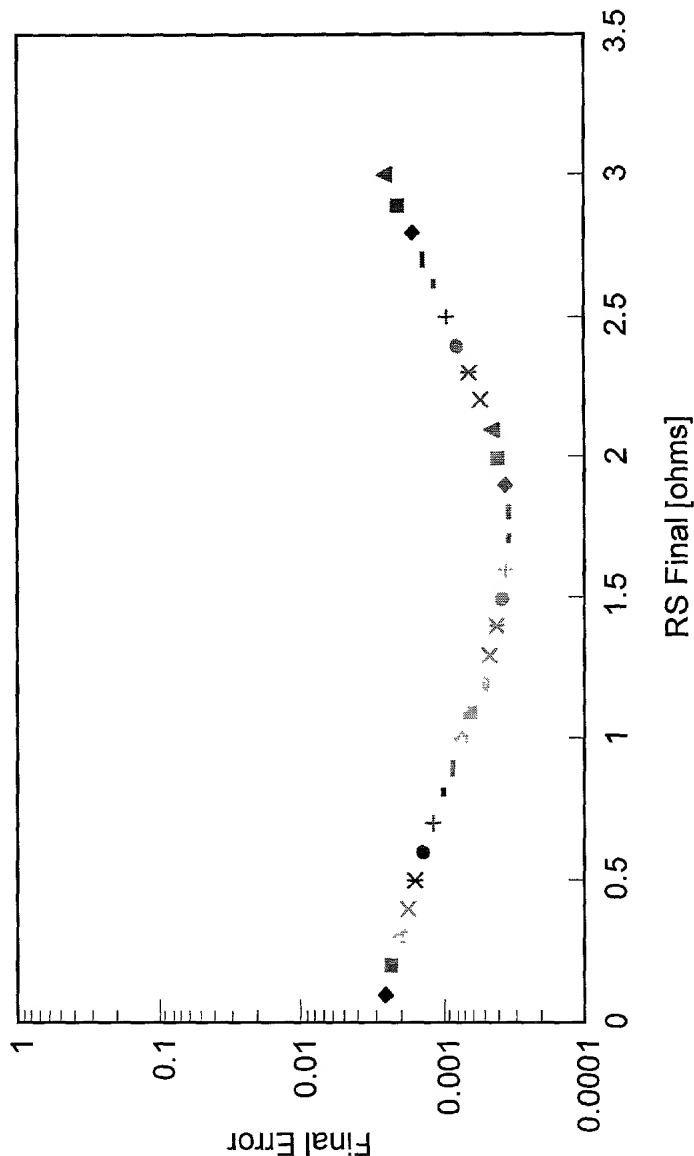


Figure 46

◆ RS=0.1,RD=0.000004, RG=3.631111  
 ■ RS=0.2,RD=0.00006, RG=3.700725  
 ▲ RS=0.3,RD=0.000006, RG=3.827767  
 × RS=0.4,RD=0.000077, RG=3.917606  
 × RS=0.5,RD=0.000002, RG=4.002959  
 ● RS=0.6,RD=0.000063, RG=4.121072  
 + RS=0.7,RD=0.000672, RG=4.225347  
 - RS=0.8,RD=0.000007, RG=4.32573  
 ■ RS=0.9,RD=0.000001, RG=4.427338  
 ◆ RS=1,RD=0.000284, RG=4.536612  
 ▲ RS=1.1,RD=0.000042, RG=4.627873  
 ■ RS=1.2,RD=0.380034, RG=4.667158  
 × RS=1.3,RD=0.861394, RG=4.69531  
 × RS=1.4,RD=1.568092, RG=4.676249  
 × RS=1.5,RD=2.072742, RG=4.704008  
 + RS=1.6,RD=2.741666, RG=4.685351  
 - RS=1.7,RD=3.309899, RG=4.711895  
 ■ RS=1.8,RD=3.901662, RG=4.722658  
 ◆ RS=1.9,RD=4.528121, RG=4.730933  
 ■ RS=2,RD=5.080991, RG=4.75499  
 ▲ RS=2.1,RD=5.649669, RG=4.781182  
 × RS=2.2,RD=6.197713, RG=4.81535  
 × RS=2.3,RD=6.720198, RG=4.855583  
 × RS=2.4,RD=7.205221, RG=4.909625  
 + RS=2.5,RD=7.705211, RG=5.01476  
 - RS=2.6,RD=8.202621, RG=5.01476  
 ■ RS=2.7,RD=8.779481, RG=5.030824  
 ◆ RS=2.8,RD=9.386087, RG=5.027081  
 ■ RS=2.9,RD=9.911043, RG=5.074825  
 ▲ RS=3,RD=10.48296, RG=5.083981  
 × RS=0.911268, RD=3.009443, RG=4.152256  
 × RS=1.439659, RD=3.33544, RG=3.769519  
 × RS=1.606168, RD=3.520349, RG=3.502953



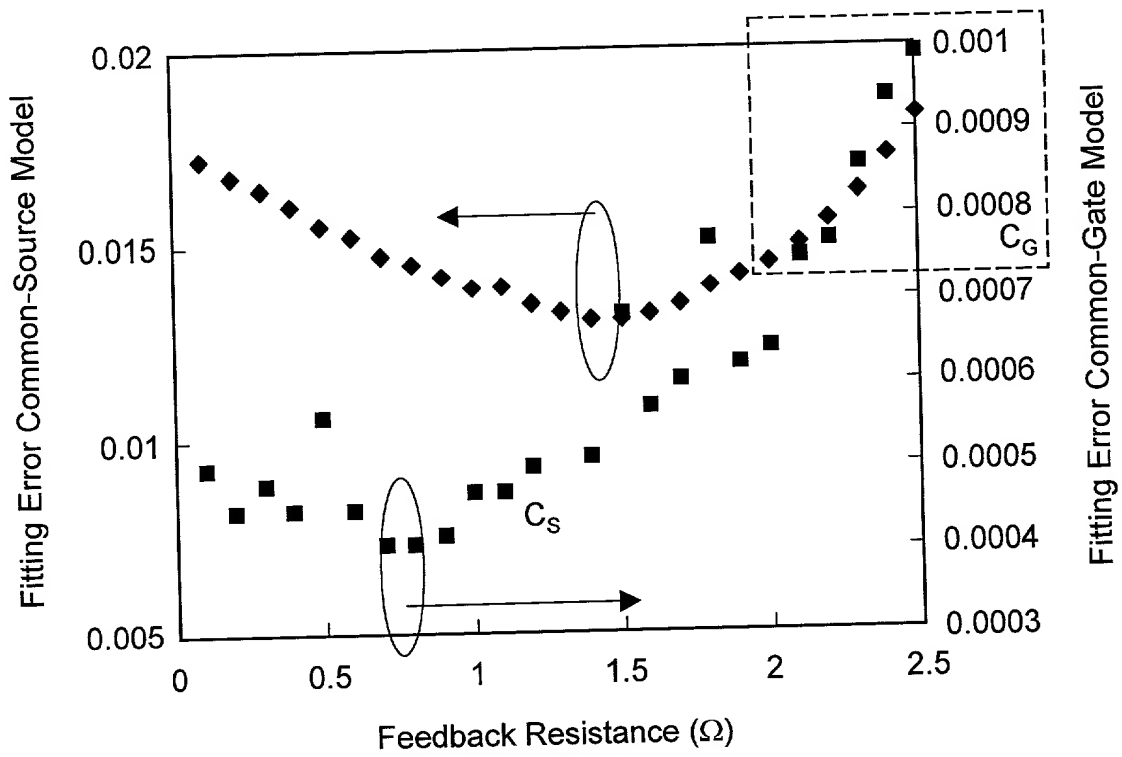
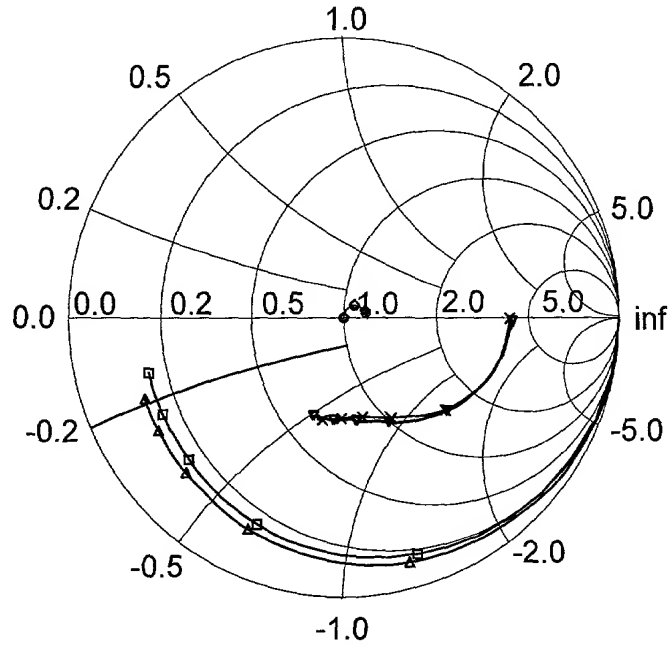


Figure 47

□ measure	○ measure	▽ measure	△ Simulated	◇ Simulated	× Simulated
SMAT1	SMAT1	SMAT1	SMAT1	SMAT1	SMAT1
S[1,1]	S[1,2]	S[2,2]	S[1,1]	S[1,2]	S[2,2]



Frequency 0.05 to 40.05 GHz

Figure 48A

□ measure	○ Simulated	▽ measure	△ Simulated
SMAT1	SMAT1	SMAT1	SMAT1
S[2,1]	S[2,1]	S[2,1]	S[2,1]
dB	db	Ang	deg
		deg	deg

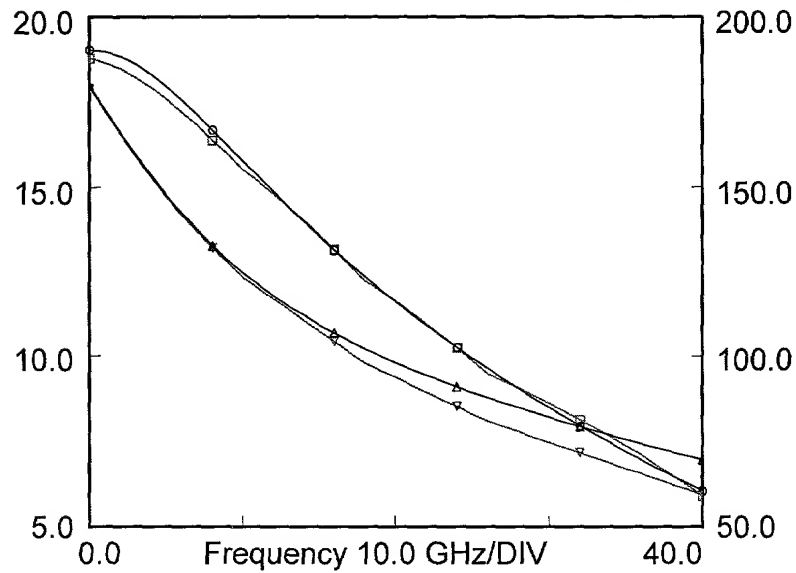
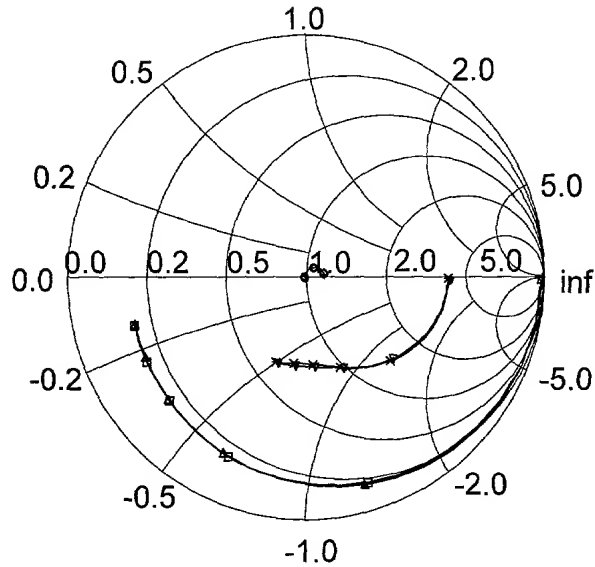


Figure 48B

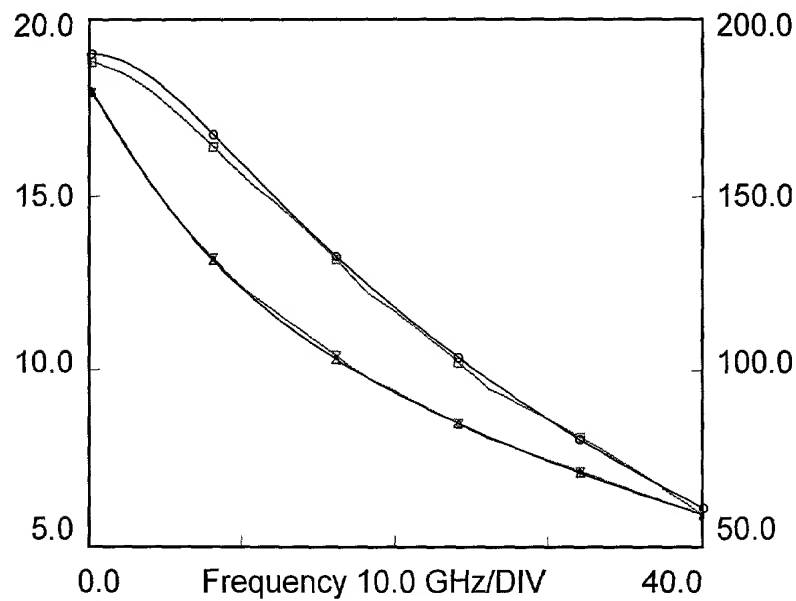
□ measure	○ measure	▽ measure	△ Simulated	◇ Simulated	× Simulated
SMAT1	SMAT1	SMAT1	SMAT1	SMAT1	SMAT1
S[1,1]	S[1,2]	S[2,2]	S[1,1]	S[1,2]	S[2,2]



Frequency 0.05 to 40.05 GHz

**Figure 49A**

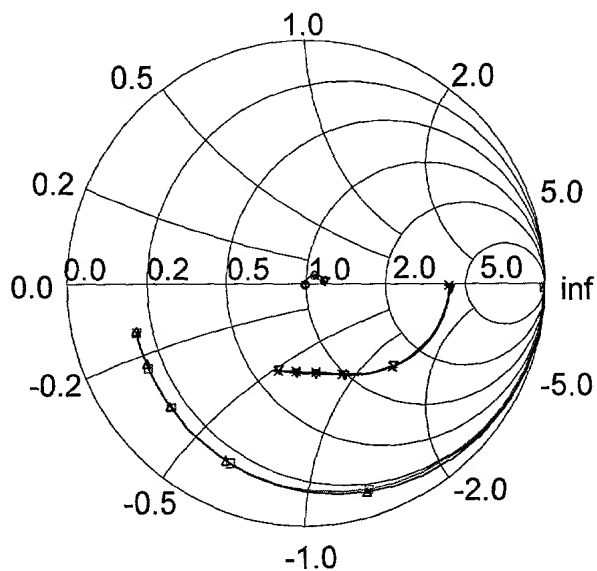
□ measure	○ Simulated	▽ measure	△ Simulated
SMAT1	SMAT1	SMAT1	SMAT1
S[2,1]	S[2,1]	S[2,1]	S[2,1]
dB	db	Ang	Ang
		deg	deg



**Figure 49B**

TECHNOLOGICAL

□ measure SMAT1 S[1,1]   
 ○ measure SMAT1 S[1,2]   
 ▽ measure SMAT1 S[2,2]   
 △ Simulated SMAT1 S[1,1]   
 ◇ Simulated SMAT1 S[1,2]   
 × Simulated SMAT1 S[2,2]



Frequency 0.05 to 40.05 GHz

Figure 50A

□ measure SMAT1 S[2,1] dB   
 ○ Simulated SMAT1 S[2,1] db   
 ▽ measure SMAT1 S[2,1] Ang deg   
 △ Simulated SMAT1 S[2,1] Ang deg

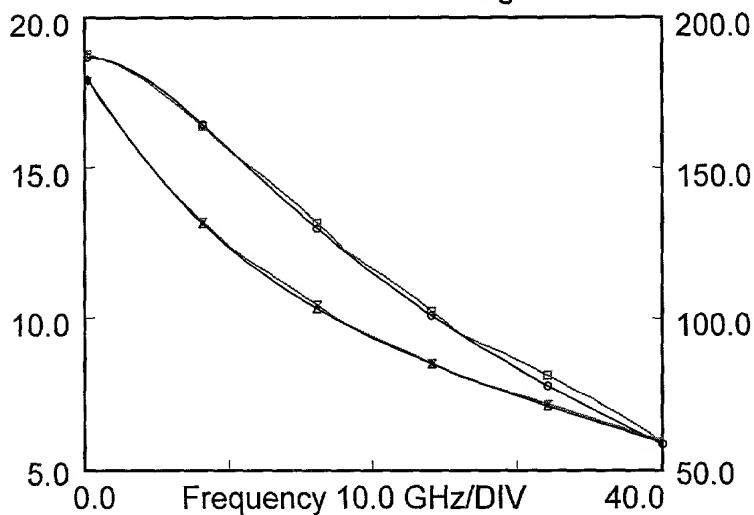


Figure 50B